

ROADS AND STREETS

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MARCH, 1944



SPRING RESHAPING
GOCEBIC COUNTY, MICHIGAN

In This Issue: 6,000,000-yd. Airport Job—A.G.C. and North Atlantic Meetings—Utah's Access Roads—Patching High-Type Flexible Pavements—County Post-war Notes—Maintaining Tank Maneuver Roads—How Contractor Overhauls G. I. Construction Equipment

ADAMS MOTOR GRADERS HAVE *Strength and Durability*



One of a series of ads on Adams motor grader features

*CARVING ROADS out of mountain sides—punching shale out of banks—making heavy ditch cuts—scarifying hard surface material—bucking heavy snow drifts—these are everyday operations for many Adams motor graders. It's work that demands strength to withstand heavy shocks and stresses. It requires durability if the machines are to stand up under punishment day after day.

Adams motor graders have that strength and durability. They get it, not through sheer bulk and weight of materials, but through painstaking engineering—engineering which is focused

always on obtaining strength without excessive weight, because unnecessary weight is a liability in any machine.

Their long life, their ease and economy of operation, their wide adaptability to all kinds of work will make Adams motor graders your best buy when again you can purchase new machines. In the meantime, use the services of your local Adams dealer to keep your present equipment rolling.



J. D. ADAMS COMPANY • INDIANAPOLIS, IND.

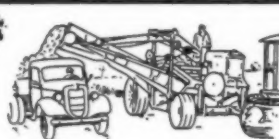
Granted a second Army-Navy Production Award for continued proficiency in the production of grading machinery for our armed forces



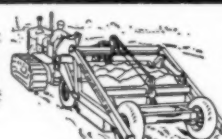
MOTOR GRADERS



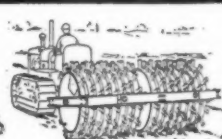
PULL-TYPE GRADERS



ELEVATING GRADERS



HAULING SCRAPERS



TAMPING ROLLERS

ADAMS

★ ROAD-BUILDING AND ★
EARTH-MOVING EQUIPMENT



WHY

Form-Set Purple Strand

is still hard to get

No need to tell wire rope users that wire rope is hard to get.

You've been telling us!

But perhaps you'd like to know why, when consumers of some other products are looking toward easing of restrictions, wire rope is still tight. Here are some of the reasons:

The shipbuilding program, with its emphasis on landing craft, will continue to make heavy inroads on wire-rope production. And so, of course, will the year's stepped-up military and naval operations. Further, the country's 1944 oil program contemplates an increase of from 18,000 to 24,000 wells — and for

wells so much deeper than ever before that oil-country demands for wire rope will leap upward from 80 to 100%.

We therefore make this suggestion: Figure your wire rope needs (and place your orders) as far in advance as possible. This offers the best assurance that the wire rope you are going to need through the year will be on hand when you need it.

And while you're thinking about wire rope, think of Form-Set Purple Strand.

"Purple Strand" means that the rope is made of "Improved Plow" steel, the strongest, toughest steel used in wire-rope manufacture.

"Form-Set" means that the wire rope is preformed, making it not only rugged but far easier to handle. Preformed wire rope gives longer service because it is much better able to stand bending fatigue.

Form-Set Purple Strand is Bethlehem's top-quality wire rope. It is made in all sizes and constructions. For the utmost in flexibility and ruggedness, and long service life, call for Form-Set Purple Strand.



ROADS AND STREETS

Vol. 87, No. 3

March, 1944



A magazine devoted to the design, construction, maintenance and operation of highways, streets, bridges, bridge foundations and grade separations; and to the construction and maintenance of airports.

WITH ROADS AND STREETS HAVE BEEN COMBINED GOOD
ROADS MAGAZINE AND ENGINEERING & CONTRACTING

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What if this 15 Billion Dollar Baby

WERE DROPPED IN
YOUR LAP?



PRESIDENT ROOSEVELT recently proposed the nationwide network of super-highways shown above. This plan would take 10 to 20 years to complete, would cost an estimated 750 million dollars annually. While this complete proposal may never reach the blueprint stage, parts of it and other impressive postwar projects now under consideration in both the United States and Canada most certainly will.

What if one or several of these "billion dollar babies" starts dropping your way? Will you be able to handle a share of this business more economically, efficiently and profitably than your competitors?

The answer may depend on how well you plan your postwar organization and equipment set-up. And that's where your Lorain distributor can help. He keeps fully informed on new equipment developments. Chances are he'll be able to pass along plenty of money-making, time-saving advice just when you need it most. So, if you haven't done so already, get acquainted with your nearby Lorain distributor now.

THE THEW SHOVEL COMPANY • Lorain, Ohio

Reg. Trade Mark
thew Lorain

SHOVELS

CRANES • DRAGLINES • MOTO-CRANES



The Merritt Parkway is known for its scenic grandeur and riding comfort to motorists who use this main artery between New York and New England. Highway engineers know that it will give years of satisfactory service because it is reinforced with millions of square feet of American Welded Wire Fabric.

THE STEEL BACKBONE OF CONCRETE *for the nation's highways*

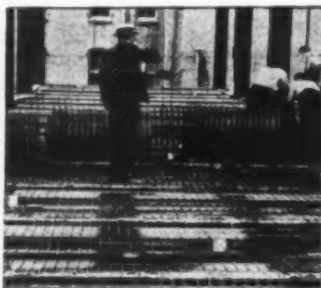
IN many of the nation's highways, American Welded Wire Fabric provides a backbone of steel that reinforces the concrete slab in every direction. The strength of the high-yield-point cold-drawn steel reduces the danger of cracking, spalling, and heaving, and, should cracks appear, wire fabric prevents their spreading. Installation is quick, easy, and

inexpensive — it lies flat, and stays in place.

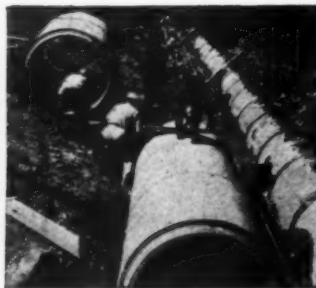
The heavy wartime loads that are passing over America's highways are proving the ability of wire fabric reinforced concrete roads to take terrific punishment. To safeguard the roads built for the future, give them the extra durability of steel. Specify wire fabric reinforcement for concrete construction.



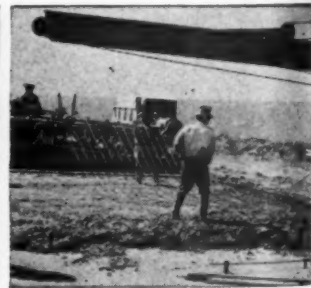
Highways—Added years of useful life are built into highways which are reinforced with cold-drawn welded wire fabric.



Buildings—The cost of installing wire fabric is low—construction time is reduced. Here it is being used for reinforcing concrete floors.



Concrete Pipe — Engineers make long life and economy doubly certain by specifying wire fabric for reinforcing concrete pipe.



Airports—Runways, ramps, roadways and aprons will last longer and require less maintenance when reinforced with wire fabric.

AMERICAN STEEL & WIRE COMPANY

Cleveland, Chicago and New York

Columbia Steel Company, San Francisco, Pacific Coast Distributors

United States Steel Export Company, New York



**AMERICAN
WELDED
WIRE FABRIC**

UNITED STATES STEEL

ASK how the NORTHWESTS are doing!



THE TIME to learn about shovel crane and dragline performance for guidance on your future purchases is right now. High pressure service—the "high ball" jobs of the war effort are a real test of equipment.

Ask how the Northwests are doing! You'll get an amazing story of trouble-free operation, low maintenance cost and dependability. More than ever before you'll learn the real reason why for years one out of every three Northwests has been a repeat order in the hands of leading contractors. Ask how Northwests are doing.

NORTHWEST ENGINEERING COMPANY

1732 Steger Building • 28 East Jackson Boulevard • Chicago 4, Illinois

NORTHWEST

SHOVELS • CRANES • DRAGLINES • PULLSHOVELS

*-and
when you have
a real Rock Shovel
you won't have
to worry about
output in dirt*



are you planning now for
BETTER POSTWAR HIGHWAYS?



When Victory is won, your highway construction plans will play a vital part in making jobs for returning service men and workers now in war industries. It is desirable and important that these plans be ready.

It is also important that they be truly "plans for the future." Postwar highways must not be subject to the ills of so many of our present roads, where annual breakups hike maintenance budgets and delay traffic.

Experience proves that wet and spongy subgrades are a major cause of road surface failures. Isn't it logical to make certain that postwar roads are built on a stable foundation? You can help do this by specifying ARMCO Perforated Pipe wherever it is needed to intercept and remove harmful groundwater. Then maintenance costs will remain low while traffic enjoys a smooth, safe, uninterrupted ride.

So include ARMCO Perforated Pipe in your plans for the future, even though you may not be able to get it for immediate construction. You'll like its flexible corrugated metal strength, tight joints, and immunity to damage from shifting soils, traffic impact or severe frost action. Write for whatever information you may need. Armco Drainage Products Association, 415 Curtis St., Middletown, O.



ARMCO PERFORATED PIPE



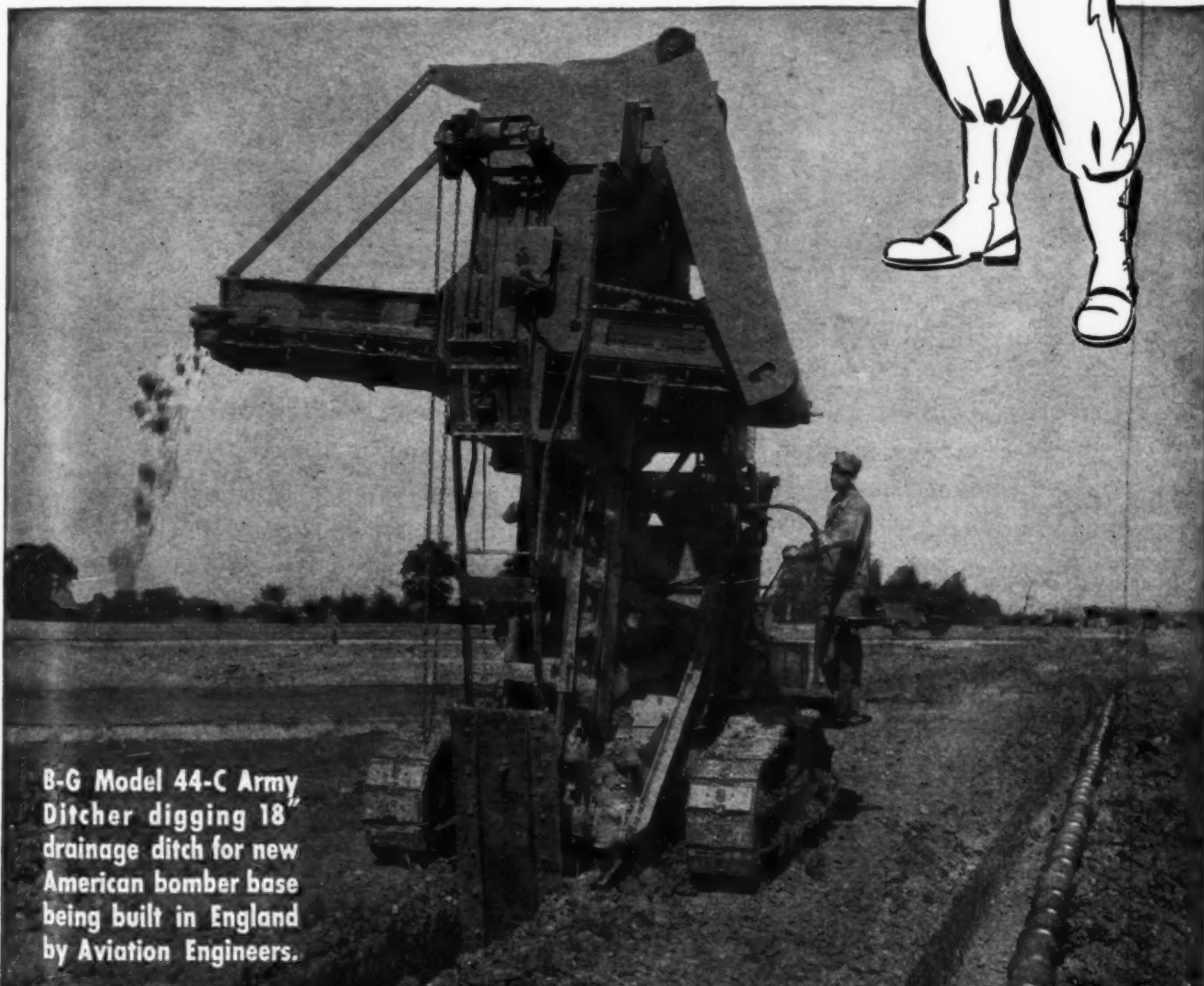
"jest ain't the same war"

That squad of pick and shovel experts of World War I isn't around for this War. Instead, there is a squad of B-G Ditchers digging faster and twenty hours a day.

Yes sir, it's a different war. Eight-foot trenches or two-foot drains, clay or rocks, it's all the same—the old shovel squad is mechanized. Better ditches, too, smooth sidewalls and straight as a bazooka barrel. Digging trenches in this war is as easy as chauffering for the general. Write for B-G Catalog 44.



44-5

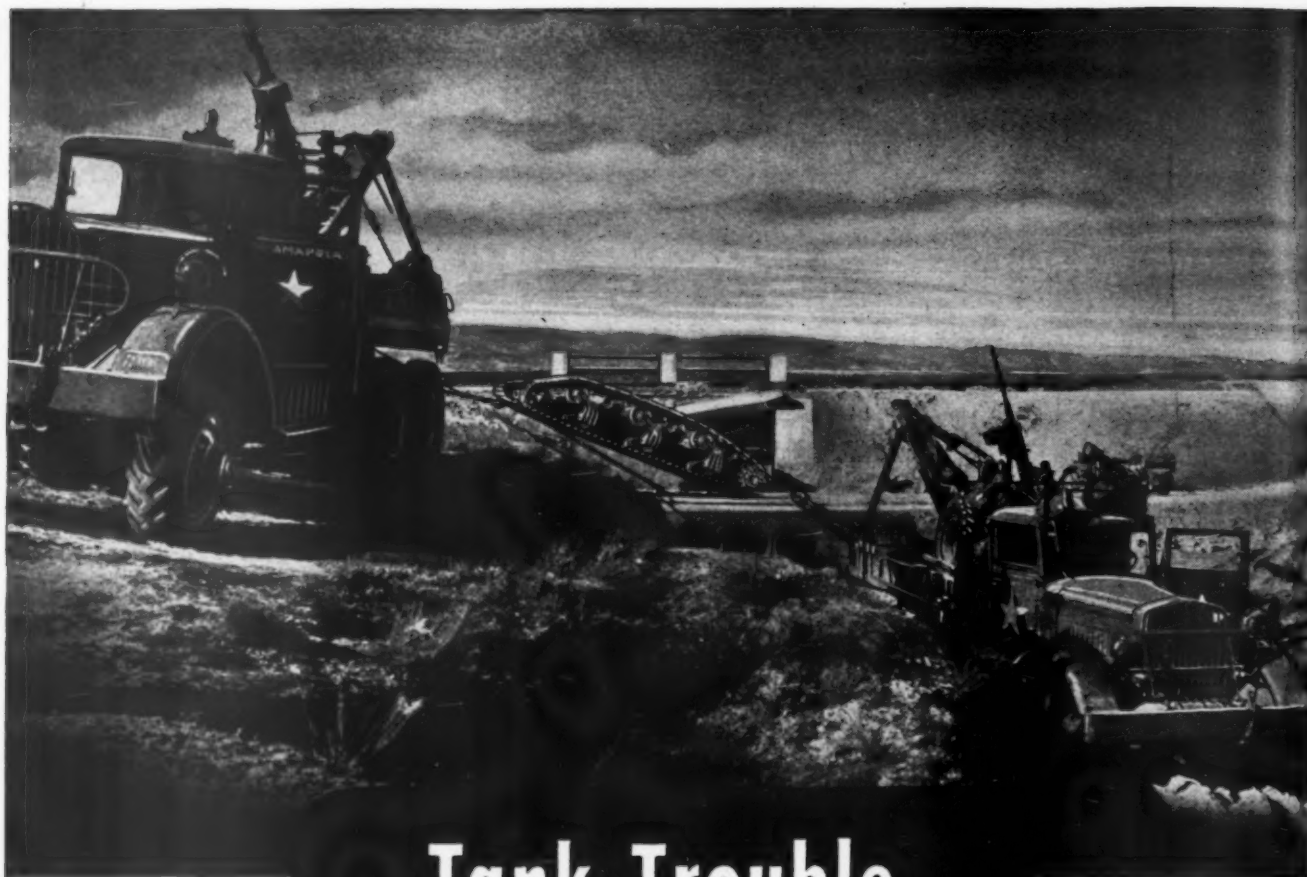


B-G Model 44-C Army Ditcher digging 18" drainage ditch for new American bomber base being built in England by Aviation Engineers.

BARBER GREENE

AURORA ILL.

ROADS AND STREETS, March, 1944



Tank Trouble

WHEN an Army tank comes a cropper, as this one did, somewhere on the invasion front, it's a job for M-type heavy wreckers, specially designed for tank recovery. Weighing fifteen tons, with power delivered to all ten wheels, armed with hoist, power winches and special gear, these big fellows command the situation.

When our present job, producing wreckers like these for Uncle Sam is

finished, you may well want similar trucks for the tough jobs in your civilian business. Many will. Or you may be thinking in terms of over-the-road tractors, heavy duty trucks, dump trucks, plows, fire apparatus, or other motorized equipment engineered to the particular work it is to do. One thing is sure . . . if it's Ward LaFrance, it will be *right* for its job. Our engineers are ready to start working with you now.

WARD LaFRANCE



TRUCK DIVISION

ELMIRA, NEW YORK

© 1944 G. A. I., Inc., Meriden, Conn.

16 Pioneer Duplex Plants

from Dawson Creek to Fairbanks!

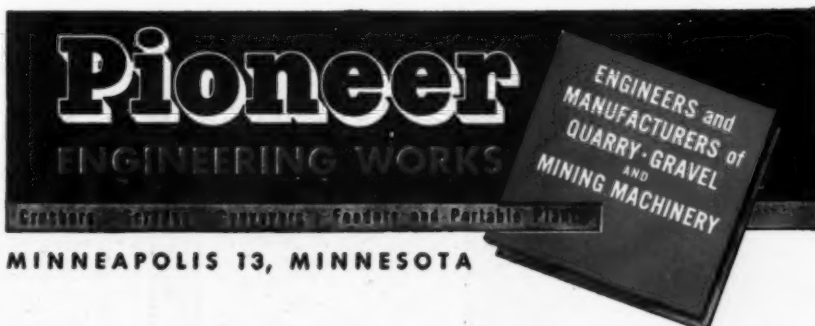


●The Alaska Highway was a mighty job as the world knows, the toughest job since the Panama Canal. The equipment of many manufacturers, the experience and skill of many contractors went into the building of these 1,671 miles of road.

Pioneer plants—16 of them in the hands of thirteen contractors produced a tremendous tonnage of vital aggregate. These Pioneer Duplex plants, portable equipment that moved with the road, gave

dependable, continuous service in doing the complete job of crushing and screening the required product from the basic material available.

This preference by able contractors for Pioneer equipment indicates a high regard for Pioneer engineering and manufacture.



KNOW YOUR NEAREST BLAW-KNOX DISTRIBUTOR

ALABAMA
Birmingham — Standard Con. Supply Co.
ARIZONA
Phoenix — State Tractor Equipment Co.
ARKANSAS
Little Rock — Lyons Machinery Company
CALIFORNIA
Los Angeles — La Bolla Machinery Co.
— E. M. Orsini
San Francisco — C. H. Grant Company
COLORADO
Denver — Ray Corson Machinery Co.
CONNECTICUT
New Haven — W. I. Clark Co.
DELAWARE
Philadelphia, Pa. — Gilles & Ransome
DISTRICT OF COLUMBIA
Washington — Mott A. Doetsch Mach. Co.
FLORIDA
Jacksonville — Florida Equipment Co.
Miami — Florida Equipment Company.
Tampa — Epperson & Company
Birmingham, Ala. —
Standard Contractors Supply Co.
GEORGIA
Atlanta — W. C. Cays & Company
IDaho
Boise — Intercontinental Equip. Co.
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Supply Co.
IOWA
Des Moines — Gierke-Babington Co.
Des Moines — Herman M. Brown Co.
KANSAS
Kansas City — G. W. Van Koppell Co.
KENTUCKY
Louisville — Brandeis Mach. & Supply Co.
Columbus, Ohio — W. W. Williams Co.
LOUISIANA
New Orleans — Southern States Equip. Co.
MAINE
Portland — Stanley-Coligan Company
MARYLAND
Baltimore — Henry H. Meyer Co., Inc.
Washington, D. C. — Matt A. Doetsch
Machinery Co.
MASSACHUSETTS
Boston — The Equipment Company
New Haven, Conn. — W. I. Clark Co.
MICHIGAN
Detroit — Wm. F. Fawcett Company
Grand Rapids — Contractors Mach. Co.
Iron Mountain — Service & Supply
Division of Lakeshore Engineering Co.
MINNESOTA
Duluth — Borchert-Ingersoll, Inc.
St. Paul — Borchert-Ingersoll, Inc.
MISSISSIPPI
Memphis — Dalrymple Equip. Co.
New Orleans, La. — Southern States
Equipment Co.
MISSOURI
Kansas City — G. W. Van Koppell Co.
St. Louis — O. B. Avery Company
MONTANA
Billings — Western Const. Equip. Co.
NEBRASKA
Omaha — Anderson Equipment Co.
NEVADA
Los Angeles, Cal. — E. M. Orsini
San Francisco, Cal. — C. H. Grant Co.
NEW HAMPSHIRE
Barre, Vt. — Casellini-Venable Corp.
Boston, Mass. — The Equipment Co.
Portland, Me. — Stanley-Coligan Co.
NEW JERSEY
New York, N.Y. — R. E. Brooks Company
Philadelphia, Pa. — Gilles & Ransome
NEW MEXICO
Albuquerque — Hardig & Coggins
NEW YORK
Albany — Larkin Equipment Co.
Buffalo — Trevor Corporation
Elmira — LeValley, McLeod & Elwood
Endicott — Newing Motors Co., Inc.
New York — R. E. Brooks Company
Rochester — Keystone Builders Supply
Syracuse — Syracuse Lumber Co.
Utica — McQuade & Bennigan, Inc.
NORTH CAROLINA
Raleigh — Carolina Tractor & Equip. Co.
Salem — Carolina Tractor & Equip. Co.
NORTH DAKOTA
Fargo — Dakota Tractor & Equipment Co.
OHIO
Cleveland — H. B. Fuller Equipment Co.
Columbus — W. W. Williams Co.
Pittsburgh, Pa. — Drive-Doyle Company
OKLAHOMA
Oklahoma City — Leland Equipment Co.
OREGON
Portland — Contractors Equipment Corp.
PENNSYLVANIA
Philadelphia — Gilles & Ransome
Pittsburgh — Drive-Doyle Company
RHODE ISLAND
Providence — The Equipment Co.
SOUTH CAROLINA
Columbia — Jeff Hunt Road Machinery Co.
SOUTH DAKOTA
Rapid City — J. D. Evans Equip. Co.
TENNESSEE
Chattanooga — Wilson-Hamelle Co.
Knoxville — Wilson-Weener-Wilkinson
Nashville — Wilson-Weener-Wilkinson Co.
TEXAS
Dallas — Cooley-Lott-Nichols Mach. Co.
Houston — R. B. Everett & Co.
UTAH
Salt Lake City — Lund Machinery Co.
VERMONT
Barre — Casellini-Venable Corp.
VIRGINIA
Roanoke — Roanoke Tractor & Equip. Co.
Baltimore, Md. — Henry H. Meyer Co.
Washington, D. C. — Matt A. Doetsch
Machinery Co.
WASHINGTON
Seattle — L. A. Snow Company
Spokane — Empire Equipment Company
WEST VIRGINIA
Charleston — Charleston Tractor & Equip.
Corp.
Pittsburgh, Pa. — Drive-Doyle Company
WISCONSIN
Milwaukee — Hunter Tractor & Mach. Co.
WYOMING
Billings, Mont. — Western Construction
Equipment Co.
Denver, Colo. — Ray Corson Mach. Co.
Salt Lake City, Utah — Lund Mach. Co.
CANADA
Halifax, N. S. — Coleman Mach. Co., Ltd.
Montreal — Watson Jack & Co., Ltd.
Regina, Saskatchewan — R. J. Frye, Ltd.
St. John, N. Y. — Dominion Dist. Co.
Toronto — W. L. Ballentine Co.
Vancouver, B.C. — B. C. Equip. Co., Ltd.
Winnipeg — Munford, McLeod, Ltd.

... for High Speed

ON ROADS AND AIRPORTS USE THE **BLAW-KNOX**

TRANSVERSE BLADE AUTOMATIC CONCRETE PAVING SPREADER

AND THE **BLAW-KNOX FINISHING MACHINE**

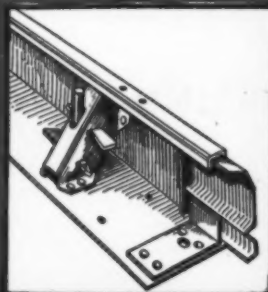
(EITHER MACHINE EQUIPPED WITH PAVING VIBRATOR IF DESIRED)

● Contractors prefer the Blaw-Knox Transverse Blade Spreader because of its enormous capacity for spreading concrete ahead of the finishing machine — its automatic spreading action regardless of where the concrete is placed on the subgrade — the absence of pressure on the side forms and avoidance of disturbing form alignment — freedom from job-interrupting breakdowns and excessive maintenance costs — does not segregate concrete regardless of maximum size of aggregate — narrow machines are convertible to wider machines and vice-versa.

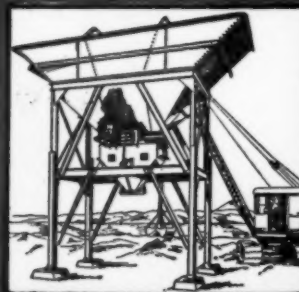
● Contractors also prefer the Blaw-Knox Finishing Machine because of the smooth finish obtained under maximum production conditions — wide screed ends prevent wastage of concrete over side forms — six traction speeds and four screed speeds for flexibility of operation to handle varying types of concrete — machine is easily and quickly adjustable for width — proper weight distribution makes machine easy on the side forms and easy to steer — low upkeep cost — easy to operate.

● The combination of the Blaw-Knox Finishing Machine and Transverse Blade Spreader has the capacity to handle the maximum output of two 34-E Dual Drum Pavers.

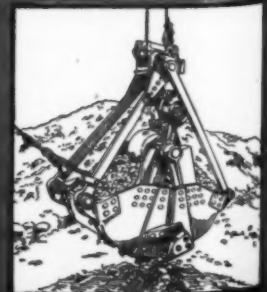
● See your nearest Blaw-Knox distributor about Blaw-Knox Finishing Machines and Blaw-Knox Transverse Blade Automatic Concrete Paving Spreaders for your next paving job.



PAVING FORMS FOR
AIRPORTS AND ROADS

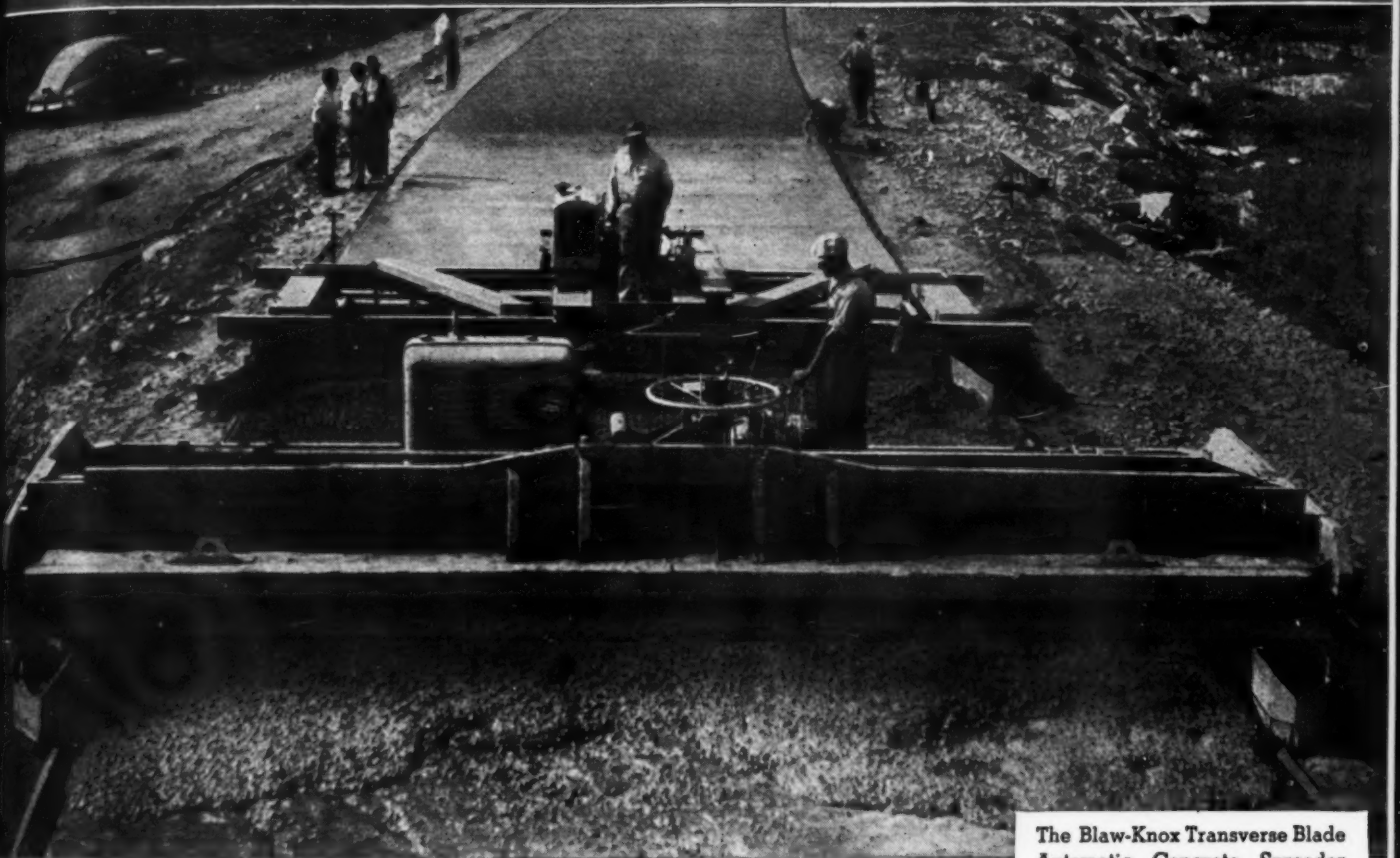


AGGREGATE BATCHING
PLANTS



CLAMSHELL
BUCKETS

ed Quality Paving Production

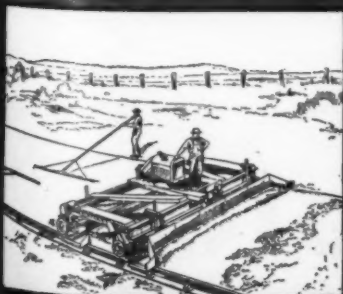
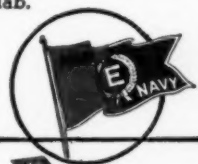


- Pick for your job the machines that have made good on the world's toughest proving grounds, paving air bases and roads for the armed forces on every front.
- New points in design and construction, war inspired, will be found in the Blaw-Knox construction equipment you'll be using for post-war construction.

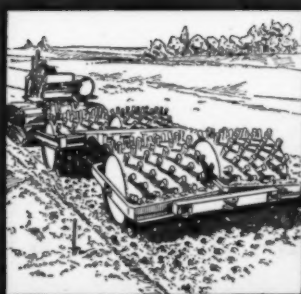
The Blaw-Knox Transverse Blade Automatic Concrete Spreader and the Blaw-Knox Finishing Machine illustrated are paving the Queens Highway — the main east and west route in Ontario, Canada. The old pavement had disintegrated under heavy war traffic. Both machines are adjustable from 20 to 25 ft. widths. Photo shows paving operations on super elevated curve, 22 ft. width of slab.

BLAW-KNOX

**BLAW-KNOX DIVISION
OF BLAW-KNOX COMPANY.**
2003 Farmers Bank Bldg., Pittsburgh, Pa.
NEW YORK • CHICAGO • PHILADELPHIA
BIRMINGHAM • WASHINGTON
Representatives in Principal Cities



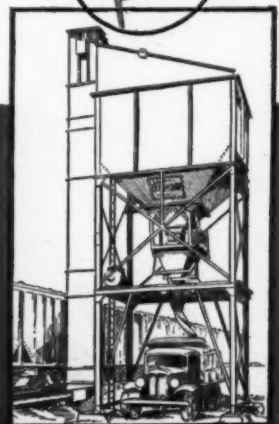
FINISHING MACHINES
FOR AIRPORTS AND ROADS



TAMPING ROLLERS



CONCRETE
BUCKETS



BULK CEMENT
PLANTS

HANSON

ENGINEERING

Ability

*HAS BEEN FOR THE PAST THREE YEARS
IN THE SERVICE OF OUR COUNTRY*

OUR full production is being used by our Fighting Forces in all parts of the World. Hanson Cranes may be found at Naval Bases and on the sea handling Torpedoes, Mines and many other types of Fighting Gear. Hanson Heavy Duty Machinery Trailers are carrying their share of fighting equipment on all Army battle fronts. Wherever our Army and Navy goes, there Hanson equipment will be found assisting our boys in fighting their way through to Victory.

On the Home Front, Hanson Crawler and Truck Mounted Excavators and Cranes are operating "around the clock" building roads and runways; in the pits and quarries; in mining enterprises and in handling materials of many kinds.

YES, that is why Hanson equipment and repairs are hard to obtain. That is why we ask Hanson equipment owners to thoughtfully take care of their present equipment, ordering only necessary new parts which are shipped promptly from our factory.

We have not lost sight of the future. We have been continuously planning and developing new and better equipment. When the lights come on again you will want the latest and best in Excavators, Cranes and Machinery Trailers. You can obtain them from Hanson.

The **HANSON CLUTCH**

TIFFIN, OHIO

TRUCK SHOVELS & CRANES

$\frac{3}{8}$ & $\frac{1}{2}$ Cu. Yard Shovels
4 & 6 Ton Capacity Cranes

Full Revolving—Low Center of Gravity—
Rugged—Flexible—Speedy—Safer.

CONVERTIBLE TO

Crane—Clamshell—Dragline—Pile
Driver—Trench-Hoe—Shovel

EXCAVATORS

$\frac{3}{8}$ and $\frac{1}{2}$ cu. yd.

Crawler or Truck Mounted

Full Revolving—Chain Crowd—Welded
Steel Construction—Low Center of Grav-
ity. Gasoline or Diesel.

CONVERTIBLE TO

Shovel — Trench-Hoe — Dragline
Clamshell — Crane — Pile Driver

CRANES

4 and 6 Ton Capacity
Crawler or Truck Mounted

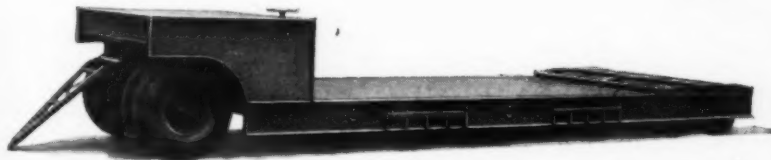
Full Revolving—Lattice Type Steel Boom
—Balanced Design—Low Center of Grav-
ity—Rugged—Flexible—Gasoline or Diesel

CONVERTIBLE TO

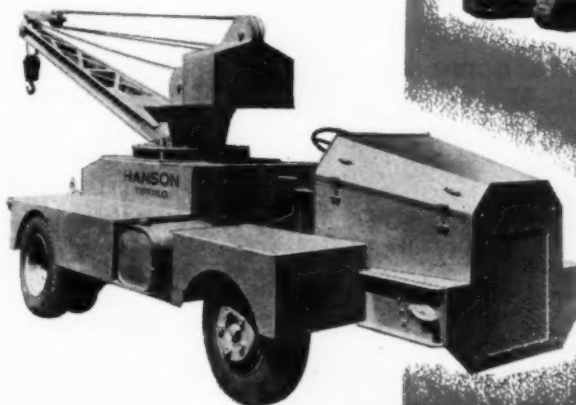
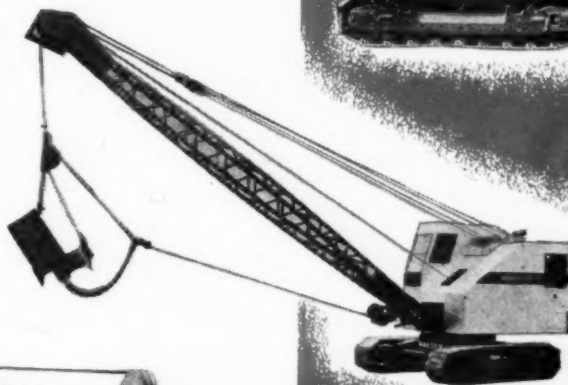
Crane — Dragline — Clamshell
Pile Driver — Trench-Hoe — Shovel

YARD & DOCK CRANE

Mobile one-man unit, 2 to 30
miles per hour, 360° Swing, 2 to
4 ton lift and carry. A Crane
with a thousand uses.



Heavy Duty Goose Neck Type



MACHINERY TRAILERS

Semi or Full
6 to 60 Ton Capacity

Oscillating Rear Axles—Pneumatic
Tires—Timken Taper Roller Bear-
ings Throughout—Brakes are Man-
ually Operated or Air Controlled.

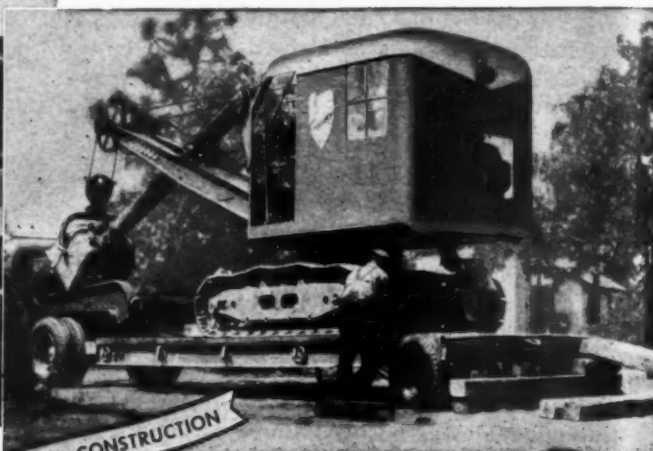
& MACHINERY CO.

IT WILL TAKE

Only A Jiffy To Get Back Into Work Clothes



This is our favorite load on a Fruehauf Trailer—a captured enemy tank, in the North African area, being carried to an army salvage depot.



Fruehauf heavy-duty Trailers will handle their civilian work even better than before, thanks to improvements born of war-time service.

WHEN we've fired the last . . . and winning . . . shot in this war, there will be a lot of work for us here at home, and all around the globe, as well. Heavy work, mostly . . . rebuilding, enlarging, new construction . . . with much material to move.

Well, as for the heavy moving, it will take us only a jiffy to take off our uniform and get back into work clothes. Heavy-duty Fruehauf Carry-all Trailers, now car-

rying tanks, disabled planes and other heavy equipment, will then carry steam-shovels, ditchers, production machinery and other civilian loads.

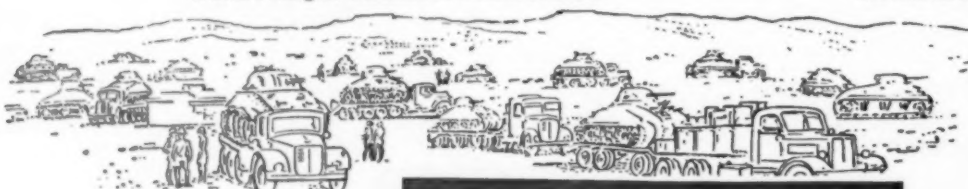
The adaptability of Fruehauf Trailers let these Carry-alls fit quickly into their military work. And the lessons learned in war service have, in turn, enabled us to build still better Trailers to serve America in the big job ahead.

FRUEHAUF TRAILER COMPANY

World's Largest Builders of Truck-Trailers

DETROIT

Service in Principal Cities



The toughest proving ground for automotive equipment — the African desert. This is one of the sectors where Fruehauf Carry-alls have gone to war.

FRUEHAUF
Truck-
TRAILERS

"ENGINEERED—

TRANSPORTATION

REG. U. S. PAT. OFF.

TRUCK-TRAILER TRANSPORT IS DOING AN ESSENTIAL JOB FOR ALL AMERICA
ROADS AND STREETS, March, 1944

7920 TONS IN 20 HOURS

PHOENIX CONS. CO.,
BAKERSFIELD, CALIF.

reports:

"In competition, we were able to mix in one pass over the same amount of materials that the other types had to mix in three passovers.

"On a job for the Division of Highways from Blackwell's corner to the county line, we mixed 7920 tons in 20 hours mixing of imported materials.

"The outstanding feature of this machine is that the oil pump is synchronized with the forward movement of the machine which insures a uniform mixture regardless of the speed at which the Road Pug is moving. Another is the fact that an inexperienced man can be taught to operate the Road Pug in a half day's time.

"Our satisfaction with the Madsen Road Pug is reflected in the fact that we have purchased three of these machines, and all three are in operation by this Company."

... MIXED WITH A MADSEN ROAD PUG *in a single pass*

NO CONTRACTOR with an eye to the future can afford to overlook the high production speed of the Madsen Road Pug—it's the highest capacity travel-mix machine on the market. Has a capacity ranging from 200 to 550 tons per hour... pumps road oil at a rate of 9000 to 12000 gallons per hour... travel-mixes at a speed of 5 to 40 feet per minute... and replenishes the road oil without interrupting production.

The Phoenix Cons. Co., reports that they

produced 7920 tons in 20 hours for the California Division of Highways. That's 396 tons per hour and 6.6 tons per minute in a single pass mixing operation to Calif. State Highway specifications. It's the kind of mixing others talk about and which the Madsen Road Pug delivers.

You can't afford to overlook this profit-maker; read what the Phoenix Cons. Co. thinks about the Road Pug and write for the new Road Pug catalog today. No obligation of course.

MADSEN IRON WORKS
HUNTINGTON PARK, CALIFORNIA



Write
for
Catalog



MADSEN ASPHALT PLANTS • ROAD PUGS • CEMENT FINISHERS • BATCHERS • COMPACTORS

HE DRIVES A WEAPON



HERE'S a fighter . . . the man in the cab of a heavy-duty dump truck, on any of the hundreds of pressing hauling jobs in wartime construction and maintenance.

He's at it from dawn to dark and back again. More miles. More hours. More tonnage. More work than ever before. Proving, day after day on roads good and bad, that a truck line is the shortest distance between two points.

Wherever there's heavy work to be done you'll find Internationals. Many of them are two years

old. More are six. But they're carrying on, in spite of shortages—of repair parts, of tires, of manpower—shortages of nearly everything needed for normal operation. They are weapons. Their work is the same as the work of the jeeps, the half-tracks, the tanks . . . it is the work of Victory.

Performance made Internationals the largest-selling heavy-duty trucks on the market. And the same toughness, the

same dependability, the same economy of operation that put them in the lead in

the days of peace keeps them there in these days of war.

KEEP YOUR OLD TRUCKS ROLLING

Careful, effective truck maintenance today is of first importance to the nation, and to every man who owns or drives a truck. International service—largest company-owned truck service organization in America—can help you keep your trucks rolling, whatever their make or model. See your International Dealer or Branch NOW, to put your trucks in tip-top shape for the busy months ahead!

And boost highway maintenance in your community!

INTERNATIONAL HARVESTER COMPANY
180 North Michigan Avenue, Chicago 1, Illinois

NEW TRUCKS—LIMITED!

The government has authorized the manufacture of a limited quantity of trucks for civilian hauling in essential occupations. For your new truck, see your International Dealer or Branch right away, and get valuable help in making out your application. Don't delay!



BUY BONDS...BUY MORE BONDS

INTERNATIONAL Trucks

ROADS AND STREETS, March, 1944

GALION



THE GALION IRON WORKS & MFG. CO.

Main Office and Works: Galion, Ohio

ROLLERS

MOTOR GRADERS

SPREADERS

ROADS AND STREETS, March, 1944

Proved in Naval Service



The Fawick Airflex Principle consists of a rubber and cord gland, which expands against the driven rim, under controlled air pressure. No arms, levers or toggles—no adjustments to make—no lubrication required. Shocks and vibration absorbed by a cushion of air.

For all Types of Heavy Duty Drives

A hundred new Diesel-powered tugboats are now being built by U. S. Army Engineers—each equipped with the Fawick Airflex Clutch.

Already several thousands of these remarkable clutches are in service in Navy vessels of many types—giving these ships a degree of maneuverability never known before.

Proved in this exacting service, under the most extreme conditions, the Fawick Airflex Clutch is fast becoming standard equipment for all kinds of heavy duty drives—on paper and rubber mills, heavy presses, hoists, cranes and draglines, oilfield drilling rigs—wherever the going is tough.

Let us tell you about the Fawick Airflex Clutch for *your* drives. Booklet on request.

FAWICK AIRFLEX COMPANY, INC.

9919 Clinton Rd.

Cleveland 11, Ohio

In Britain, Crofts Engineers, Ltd., Bradford, England

FAWICK *Airflex* CLUTCH

POWER CONTROLLED BY AIR

LOOK AT ROAD PERMANENCE
WITH THIS VIEWPOINT



Time has proved that *Steel* assures roads **THAT ENDURE!**

Look at this record of steel-reinforced concrete road construction—over 30 years of economical service under all types of traffic conditions, and subjected to all kinds of weather conditions in every part of the country!

Truscon Welded Steel Fabric Reinforcement, and associated Truscon steel roadbuilding products, have played a big part in establishing this impressive record for concrete highways.

What the cord fabric is to the modern automobile tire, Truscon Welded Steel Fabric is to the modern highway that carries it. Both provide reinforcing . . . both add immeasurable strength and extra service to a strong basic material. You can be *sure* that Truscon Welded Steel Fabric Reinforcement, and associated Truscon Steel roadbuilding products, will build better roads for the communities you serve, and greater prestige for you.

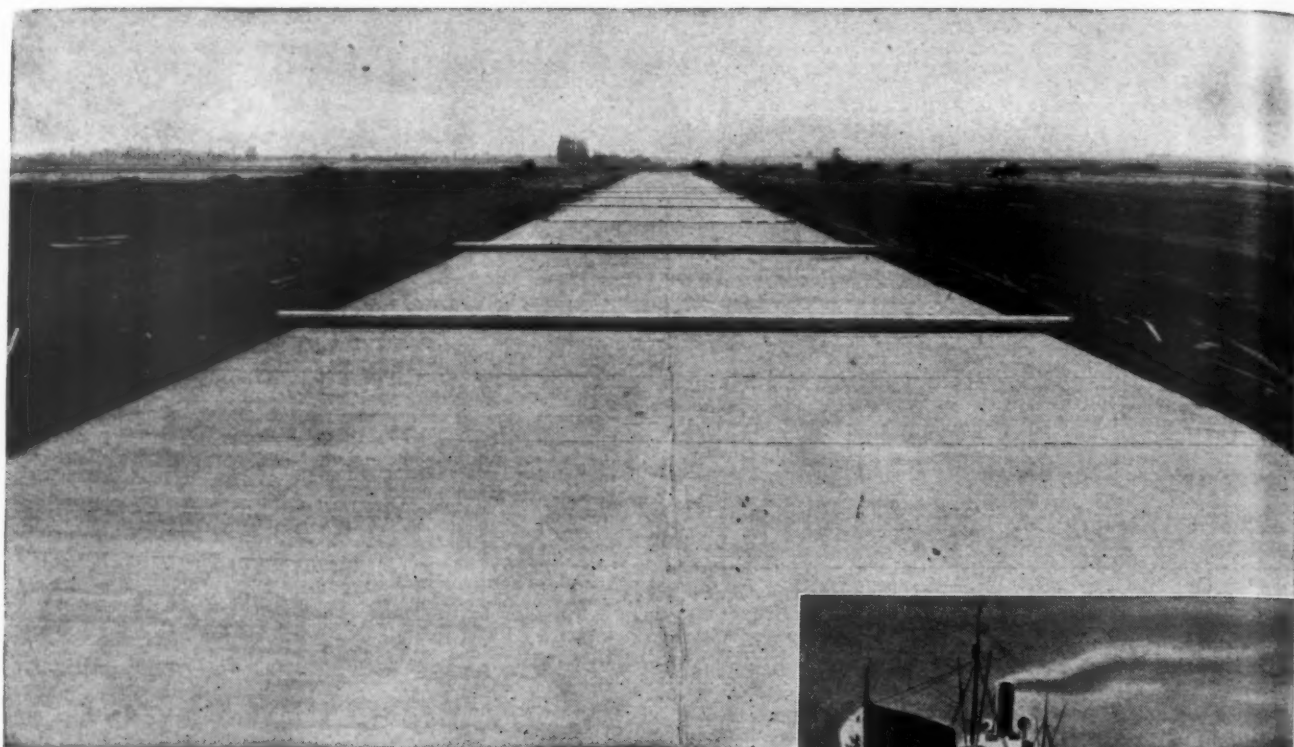


TRUSCON
Steel Company

YOUNGSTOWN 1, OHIO

SUBSIDIARY OF REPUBLIC STEEL CORPORATION

ROADS AND STREETS, March, 1944



SISALKRAFT



Serving for Victory . . . on Highways and High Seas!

"Somewhere in America" this concrete road was poured — and protected by SISALKRAFT during the curing period. Note the 60-ft. SISALKRAFT blankets, re-rolled for repeated re-use.

On the high seas SISALKRAFT protects deckloads of war supplies from ice, sleet, salt water, snow and dirt — successfully withstands unprecedented punishment! In the holds of our merchant marine SISALKRAFT-wrapped

goods are protected from scuffing, tearing and insidious moisture!

SISALKRAFT, the weatherproof, tear-resistant, scuffproof road blanket is serving for Victory on land and sea — and establishing an unmatched record for toughness and ability to withstand terrific abuse.

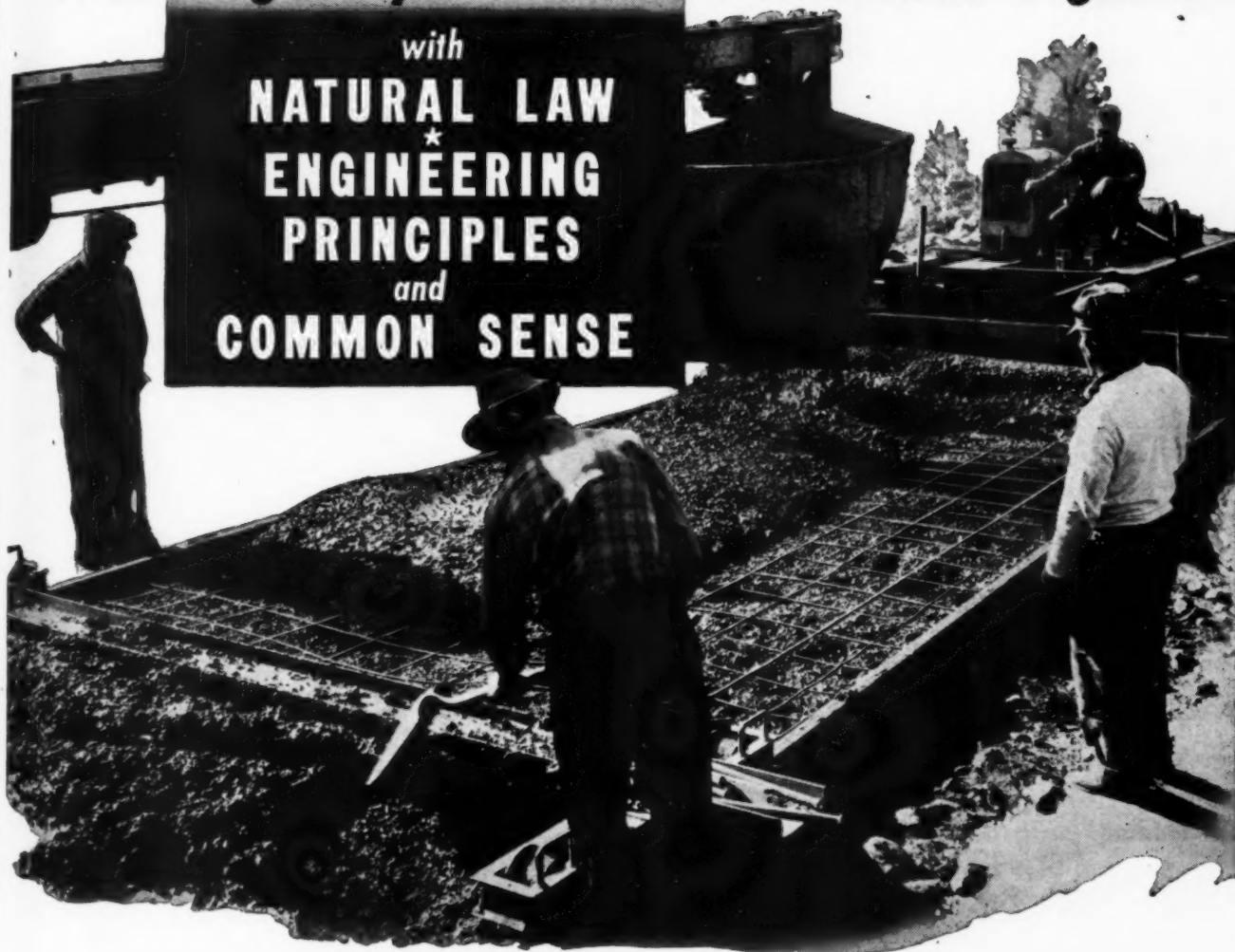
When Victory is won SISALKRAFT will again be at your service — to protect newly poured concrete and for general job protection — ready to serve you as dependably as it is now serving our Nation and our Allies.



Manufacturers of SISALKRAFT, FIBREEN, SISAL-X, SISALTAPE AND COPPER-ARMORED SISALKRAFT

These highway builders worked hand in glove

with
**NATURAL LAW
 *
 ENGINEERING
 PRINCIPLES
 and
 COMMON SENSE**



Cracks, once started in unreinforced concrete road surfaces need only the action of moisture and frost, or the friction between slab and sub-grade due to expansion and contraction, to spread wider and wider, deeper and deeper, until the slab is seriously damaged. This is Nature.

But . . . when conditions which cause cracking meet the unyielding resistance set up in concrete by *Welded Wire Reinforcement*, damaging progress is definitely retarded, often positively stopped. And when incipient cracks do occur they are held in control by the accurately spaced mesh so

that no serious enlargement can develop. This is Engineering.

Because these qualities of reinforcement are so self-evident, so inescapable, most modern highways, landing fields and other concrete surfaces are laid with Steel Reinforcement—more specifically, with *Pittsburgh Welded Wire Reinforcement*. This is Common Sense.

When planning concrete construction write us for full technical information.

PITTSBURGH STEEL COMPANY
 1661 GRANT BUILDING • PITTSBURGH, PA.



Pittsburgh Welded Wire Reinforcement

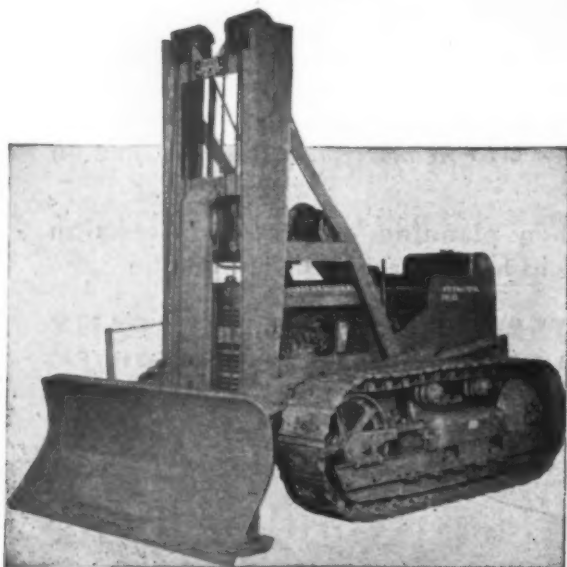
HOUGH

Cable-Operated Tractor Shovels For International T-6, TD-6, T-9 and TD-9 Tractors

Hough cable-operated shovels are extremely easy to operate because of proper balance and easy to maintain because of fully enclosed clutches and brakes. The automotive type main drive from engine crankshaft to hoist through hardened steel gears and propeller shaft equipped with universal joints eliminates chains and belts. Clutches, brakes, gears, bearings, etc. are over-size and of ample capacity for the most abusive service. Raising time of loaded $\frac{1}{2}$ or $\frac{3}{4}$ yd. bucket is 9 seconds, and lowering time only 2 seconds.

These rugged, time and cost lowering shovels have proved economical in *cost-per-yard handled*. They are shipped completely mounted—ready for operation. Write for descriptive bulletin or call your nearest International Industrial Tractor Dealer.

THE FRANK G. HOUGH CO.
Libertyville, Illinois
"Since 1920"



ROADS AND STREETS, March, 1944

BETTER



BALANCE



HOUGH

"HUFF"
Tractor Shovels

Road Sweepers

A BULLDOZER—BY QUICK CONVERSION

In less than 10 minutes the buckets can be removed and bulldozer blades attached. Both straight and reversible blades are available. All blades are equipped with hardened reversible cutting edges. Mushroom type grading shoes are standard equipment. Blades can be quickly set to angle right or left, or for bulldozing straight ahead. *Maximum ruggedness is inbuilt.*

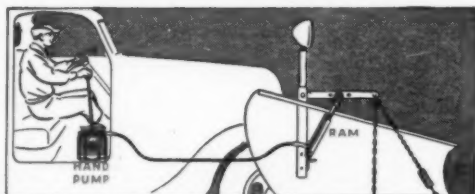
There are over 3000 Hough Tractor Shovels in Service

Modernize your Equipment *Now*
Power-Packer
 with Hydraulic Units



HAND OPERATED

P-60 Power-Packer — mounts in cab — this compact, remote control unit operates single ram on the same principle as the world-famous Blackhawk Hydraulic Jacks. Can be installed and operated in any position.



POWER DRIVEN

P-104 Power-Packer — belt or gear driven — mounts in any position — control valve is operated from cab. Compact, easily installed — this power driven unit increases the already great range of Power-Packer utility. There's nothing else like it.



EASY and inexpensive to install — Power-Packers give you faster, smoother, more positive and dependable raising and lowering with *hydraulic* power — plus handy, remote, precision control. Compact, powerful, easy to operate and maintain, Power-Packers are available for quick changeovers on any bulldozer, scarifier, scoop, scraper, or other

road machine — old or new. No matter what particular job of lifting or lowering your equipment calls for, you can do it better, safer, surer with Blackhawk Power-Packers. Two types — hand operated or power driven. For complete list of advantages, write your equipment manufacturer — or write us direct. And when ordering new equipment be sure to specify Blackhawk Hydraulic Controls.

BLACKHAWK

Hydraulic Equipment

A Product of **BLACKHAWK MFG. CO.**
 DEPARTMENT RS MILWAUKEE 1, WIS.



HEAT

CLINIC IN ACTION!

.....THESE MEN
ARE DECIDING
HOW MUCH — FROM
HOW LITTLE



THE engineers shown above are carrying on exacting tests to see how much usable heat they can squeeze from the least amount of fuel-oil—what's known in technical language as "efficiency."

The machine being tested is a Cleaver-Brooks steam generator, but all types of Cleaver-Brooks equipment are subjected to exhaustive analysis and test—in the laboratory and the field under actual "job" conditions.

Research is a constant activity at Cleaver-Brooks, recognizing that war's end will set in action a nation-wide job of road construction and rehabilitation.

Time and cost-saving machines will enable you to handle more jobs with more profit. Be ready—be competitively equipped—to get your full share of the work.

Write today for full information on Cleaver-Brooks Tank

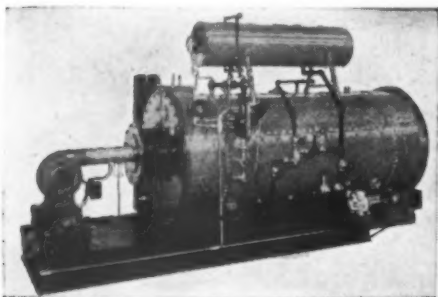
Car Heaters and Bituminous Boosters. Get the complete facts on their high speed low cost performance—heating road oils and bituminous materials to application temperatures. Learn why the original and exclusive Cleaver-Brooks four-pass down-draft flue travel and integral burner construction, plus the positive dry-coil method of condensate return, provides unsurpassed speed and economy.

Cleaver-Brooks Tank Car Heaters are built in two and three tank car sizes—Portable Pumping Boosters in two capacity sizes, with truck mounting or 4-wheel trailer.

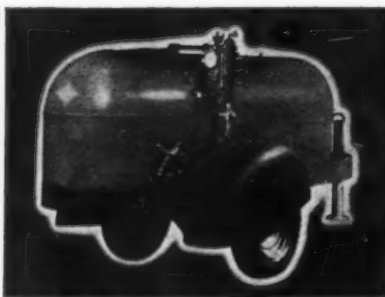
*Send for bulletins or see your
Cleaver-Brooks distributor*

CLEAVER - BROOKS COMPANY

5106 North 33rd Street • Milwaukee 9, Wisconsin



Cleaver-Brooks oil-fired automatic steam plants—available in 8 capacity sizes up to 100 H. P., working pressures to 200 lbs. Requires only simple field connections to place in operation.

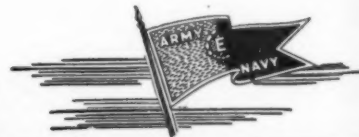


Cleaver-Brooks Portable Tank Car Heater — a high pressure, oil-fired, compact mobile heater, available in two and three tank car sizes.

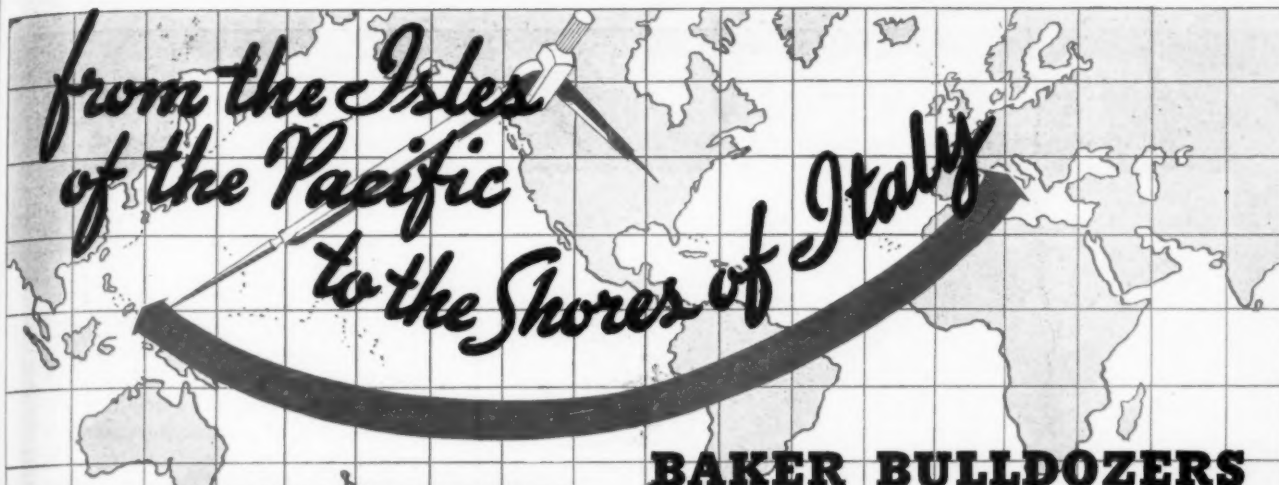


Truck-Mounted Cleaver-Brooks Portable Pumping Booster used in airport, flight strip, and road construction.

Cleaver-Brooks



TANK CAR HEATERS . . . BITUMINOUS BOOSTERS . . . AUTOMATIC STEAM PLANTS



BAKER BULLDOZERS



This is a dirt moving war. Major General Eugene Reybold, Army Engineers' Chief, recently stated: "Victory seems to favor the side with the greater ability to move dirt." The Allies certainly have that ability. And in no small way Baker Hydraulic Bulldozers and Gradebuilders are helping to clinch Victory for our side.

The Baker at left, one of many with our fighting forces in the South Pacific—in fact, all over the Orient—is clearing the way for a road on Bougainville Island. The Baker Gradebuilder mounted on an Allis-Chalmers tractor, shown below, is helping to get personnel and materiel ashore near Salerno, Italy.

Bakers are called upon to do all of the peace-time jobs such as building roads and landing strips and removing debris, plus a lot that are not in the book like filling bomb craters, throwing up revetments, filling to replace destroyed bridges, pushing stuck trucks and digging underground munitions and fuel dumps.

Bulldozers are setting the pace in the march to the Axis capitals—Bakers are going to the "fronts" just as fast as we can turn them out.

THE BAKER MFG. CO.

506 Stanford Avenue • Springfield, Illinois



PRACTICAL POST-WAR PLANNING NOW!

Many highways and roads, neglected through the war, will need repair or replacement. Many new highways are needed that will facilitate inter-city communication. New airports will be needed.

Intelligent planning now will eliminate confusion later and will help to stop the gap between demobilization and re-employment of those in the armed forces.

A copy of "A Sound Plan," detailing a program to hedge against post-war deflation, is available to those interested from the American Road Builders' Association, 1319 F St., N. W., Washington, D. C.

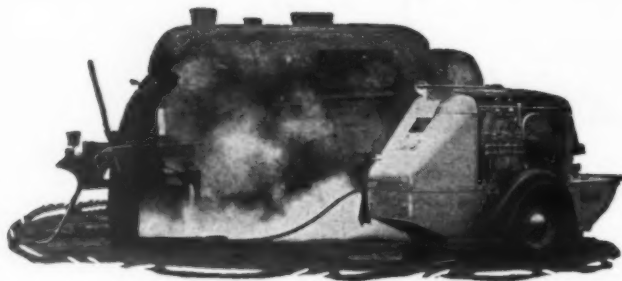
BULLDOZERS SNOW PLOWS

BAKER

CONSTRUCTION EQUIPMENT

ROADS AND STREETS, March, 1944

"TANKAR" HEATER



The Littleford "Tankar" Heater is the fastest steam producing unit ever designed. It will develop steam in two minutes' time. "Tankar" Heater will heat tank cars in 1/3 less time than ordinary units.

This Littleford Unit can also be used to clean motors, engines, all types of Road Equipment, platforms, garage floors, walls, etc.

"Tankar" Heater is small, compact, completely automatic, easy to trail. For a modern fast tank car heating or equipment cleaning unit, be sure you use this Littleford "Tankar" Heater.



LITTLEFORD

Littleford Bros., Inc.
434 E. Pearl St.
Cincinnati, Ohio

How to check your performance for Maximum Tournapull Operating Efficiency



LOADING . . . Check These Points

1. Are loads heaped each trip?
2. Is the load being obtained in 100 feet or less?
3. Is the load obtained in 1.0 minute or less?
4. Is traffic control keeping units coming into the pit at intervals of 1.5 to 2.0 minutes so that the pusher tractor will work efficiently—and so avoid unnecessary waiting by Tournapull units?
5. Is the pusher step-loading to reduce lost time and travel in the pit? (See job photo below right)
6. If the material is too hard to load in efficient time and distance, is Rooter being used to break it up?
7. Always establish down-hill loading. It's rarely ever impossible.

TRAVELING . . . Check These Points

1. Are roadways good enough to allow high gear travel at all times? 14 m.p.h. or over? If not . . .
2. Is the Tournapull-Scraper being used to keep haul roads in good condition? Or is a patrol available as the logical tool for this work?
3. Is each turn being made in .25 minute or less?
4. Is the operator utilizing full r.p.m. to obtain the quickest acceleration—thus increasing average speed?

SPREADING . . . Check These Points

1. Are loads being spread in the highest possible gear?
2. Is spread made in .5 minute or less?
3. Is spread being made in 65 to 100 feet (approx. 8 inches to 5 inches loose depth)?
4. Is operator getting off the fill as quickly as possible?

MECHANICAL—(Check with LeTourneau Maintenance Manuals)

1. Are all adjustments maintained?
2. Are blades installed properly to maintain sharp cutting edge?
3. Is all cable running free?
4. On hard smooth roads, are tires at maximum pressure? (See LeTourneau Tire Chart)
5. For off-the-road work, are tires at minimum pressure, in relation to the load, to obtain flotation? (See LeTourneau Tire Chart)
6. Are all mechanical moving parts greased and operating freely? (See LeTourneau Lubrication Chart)

Use this Simple LeTourneau Check-List—It Covers Your Complete Earthmoving Cycle, Shows You How to Move Bigger Loads Faster and at Less Cost

To help you take fullest advantage of your Tournapulls' ability to move bigger yardages fast, here is a quick, easy way to check every operating step. This simple Tournapull check-list, prepared by the LeTourneau Field Engineering Department, shows you how to keep your rigs working at top efficiency in the cut, traveling and on the fill. Use it regularly for your Tournapull check-up to eliminate waste time and speed yardage output.

Another Time-Saver—Dealer Service

If your check-up shows a need for parts or repairs, call on your LeTourneau dealer. He's equipped to handle your service problems with a minimum of time out for repairs.

LeTourneau Co-Operator Offers More Help —Write for Copy

To keep your operators and repair crews informed on the most practical operating, service and repair methods, The LeTourneau Co-Operator is offered to you and your men FREE. 16 fact-packed pages . . . published 10 times yearly. Read regularly by over 50,000 contractors, loggers, miners and others who use and service LeTourneau equipment. Write for your copies TODAY. Address R. C. LeTourneau, Inc., Dept. RS-344, Peoria, Illinois.



As loaded Tournapull pulls out of the pit, pusher tractor is ready to swing around and contact second Tournapull, already loading in opposite direction.

Manufacturers of DOZERS, CARRYALL* SCRAPERS, POWER CONTROL UNITS, ROOTERS*, SHEEP'S FOOT ROLLERS, TOURNAPULLS*, TOURNAROPS*, TOURNATRAILERS*, TOURNAWELDS*, TOURNACRANES*.

*Trade Mark Reg. U. S. Pat. Off.

LETOURNEAU

PEORIA, ILLINOIS • STOCKTON, CALIFORNIA

ROADS AND STREETS, March, 1944

MAXIMUM LOAD TRANSMISSION IS ASSURED WITH KEYSTONE ASPHALT MASTIC BOARD CENTER STRIP

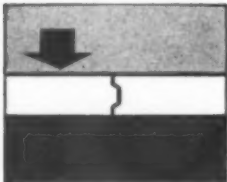
Easily installed and held
in position by stakes

Tongue and groove joint allows for
normal expansion and contraction

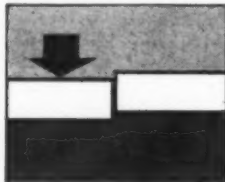


Tongue and Groove Design Prevents "Blow-ups"

KEYED LOAD TRANSMISSION



Keyed joint distrib-
utes load without
cracking.



Butt type joints un-
able to distribute
load - crack and sink.

AVERAGE LONGITUDINAL JOINT EFFICIENCY



Engineering authorities are firmly convinced that the rectangular tongue and groove design of Keystone Asphalt Mastic Board Center Strip maintains a higher joint efficiency than any other design.

Keystone Asphalt Mastic Board Center Strip, either with or without dowel bars, keys the slabs together to provide maximum load transmission. The resilience of its composition prevents compressive failures or "blow-ups"

Made from ageless asphalt and mineral fillers, this joint is rigid, waterproof and flexible. It is used both longitudinally and transversally.

Write for Keystone's catalog
and samples today

Keystone
ASPHALT PRODUCTS CO.

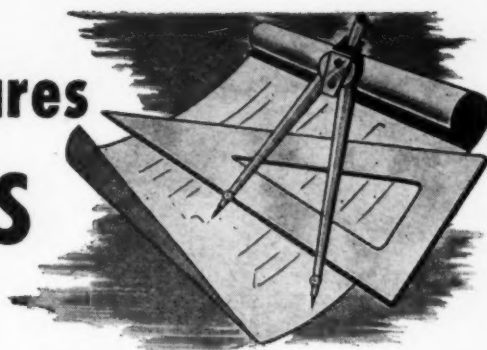
A DIVISION OF AMERICAN-MARIETTA CO.

GENERAL OFFICE

43 E. OHIO STREET... CHICAGO 11, ILL.
MANUFACTURING PLANT • CHICAGO HEIGHTS, ILL.

PREMOULDED ASPHALT AND FIBRE EXPANSION JOINTS AND ACCESSORIES.
JOINT SEALING COMPOUNDS AND CRACK FILLERS

JAEGER offers these figures to POST-WAR PLANNERS

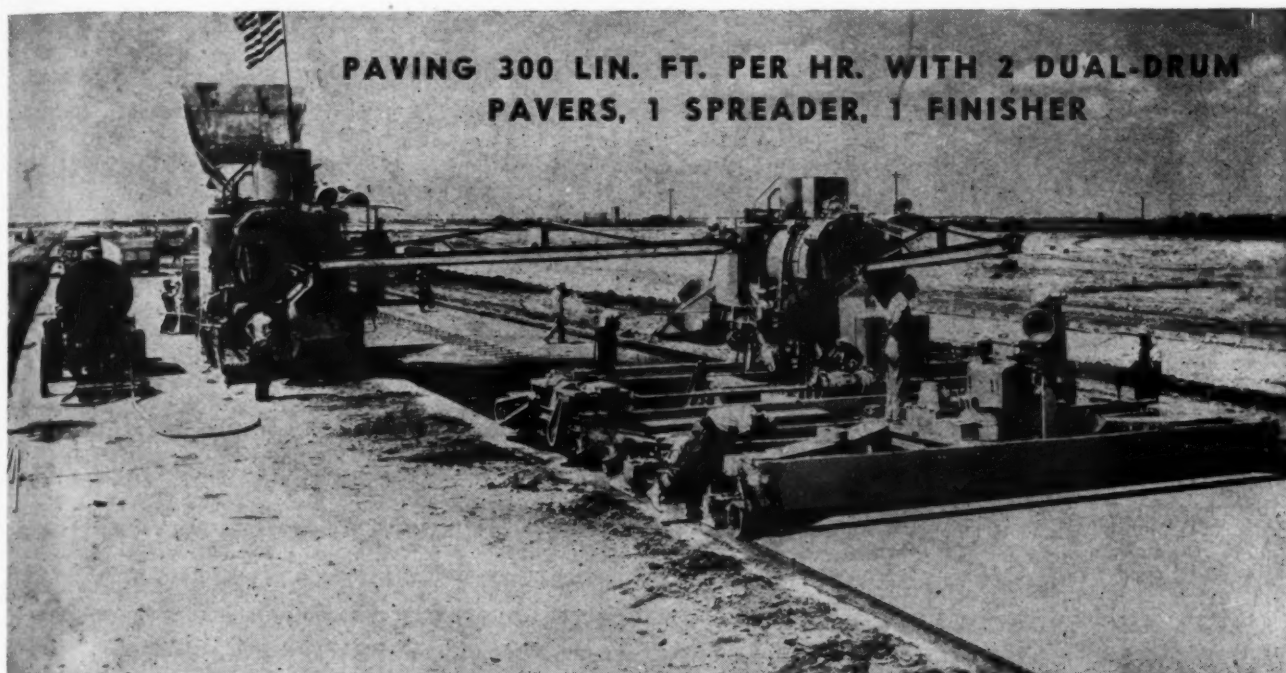


Compared with the last World War year of 1918, the placing and finishing of concrete highways and airports is now being accomplished 6 to 10 times faster and at approximately one half the cost per yard.

This progress, already achieved to meet war-time schedules, is directly due to the development by the paver industry of the dual drum paver and

the development, by Jaeger-Lakewood, of the mechanical concrete spreader and finisher — the team that broke the bottleneck behind the paver.

Planners of post-war projects and contractors who will build them will both be interested in the comparative figures offered below:



HIGH PRODUCTION: In 1918 an hourly rate of 40 lin. ft. of 18 ft. slab (80 sq. yds.) was fast work for a paver and Lakewood Finisher.

Today, runs of 300 ft. of 25 ft. slab (833 sq. yds.) per hour are being made by using two 34E dual drum pavers followed by one Jaeger Screw Spreader and one Jaeger-Lakewood Type "H" Finisher. On an Ohio glider base the pace of 314 ft. per hour was maintained for 17 hours, resulting in a single day's production of 5335 ft. of 25 ft. wide slab.

LONG LIFE: In 1918, from 30 to 40 miles of work wore out a finisher. Today's machine can do 150 to 200 miles in spite of much drier, harsher material, do 1,000,000 sq. yds. with the first set of screed shoes.

LOW COSTS: Comparing equipment

costs, a contractor today can buy one 34E dual drum paver, Jaeger Finisher and Spreader for the price of two 1918 pavers and finishers and, with this single outfit, do 3 times the day's yardage possible with two 1918 outfits and crews.

Finally, the cost per sq. yd. of pavement is approximately 50% lower — and the concrete is stronger, denser and far more uniform because mechanical handling permits dry vibratory mixtures and eliminates segregation.

THE JAEGER MACHINE COMPANY
223 Dublin Avenue Columbus 16, Ohio

JAEGER Engineered EQUIPMENT

ALSO "SPEEDLINE" MIXERS, "SURE-PRIME" PUMPS, "DUAL-MIX" TRUCK MIXERS,
JAEGER HOISTS, "FLEET-FOOT" CRANE-LOADERS,
"AIR-PLUS" PORTABLE COMPRESSORS

Facts About Air-Entraining Portland Cement for Concrete Pavements



Technical research in laboratory and field has proved that concrete pavements built with air-entraining portland cement are highly resistant to severe frost action and scaling caused by use of sodium or calcium chlorides for ice removal.

Improved methods of protecting existing concrete pavements from such scaling are now available.

Advances have also been made in methods of placing concrete pavements in cold weather.

SCALE-RESISTANT CONCRETE PAVEMENTS

Four-page illustrated information sheet describes construction procedure using air-entraining portland cement to build pavements which resist severe frost action and scaling due to use of sodium or calcium chlorides for ice removal.

PROTECTION FOR EXISTING PAVEMENTS

Tested, economical methods of applying protective coatings to existing concrete pavements to prevent scaling from the above causes are described and pictured in a four-page information sheet.

PAVING IN COLD WEATHER

Eight-page illustrated information sheet gives specifications and describes latest methods of placing concrete pavements for roads, streets and airports during winter weather.

• Any one or all three of these information sheets are available on request —free in the United States and Canada.

PORTLAND CEMENT ASSOCIATION, Dept. 3-28, 33 W. Grand Ave., Chicago 10, Ill.
A national organization to improve and extend the uses of concrete . . . through scientific research and engineering field work



EMERGENCIES REQUIRE QUICK ACTION!



Schramm Compressors furnish air on moment's notice!

Merely by easily moving a Schramm Air Compressor onto the job—and touching a starter button—you get all the compressed air you want—and the emergency job is sped along!

Illustrating the time Schramm was needed to furnish air so that a road atop a busy highway bridge leading to a state capitol could be repaired—quickly!

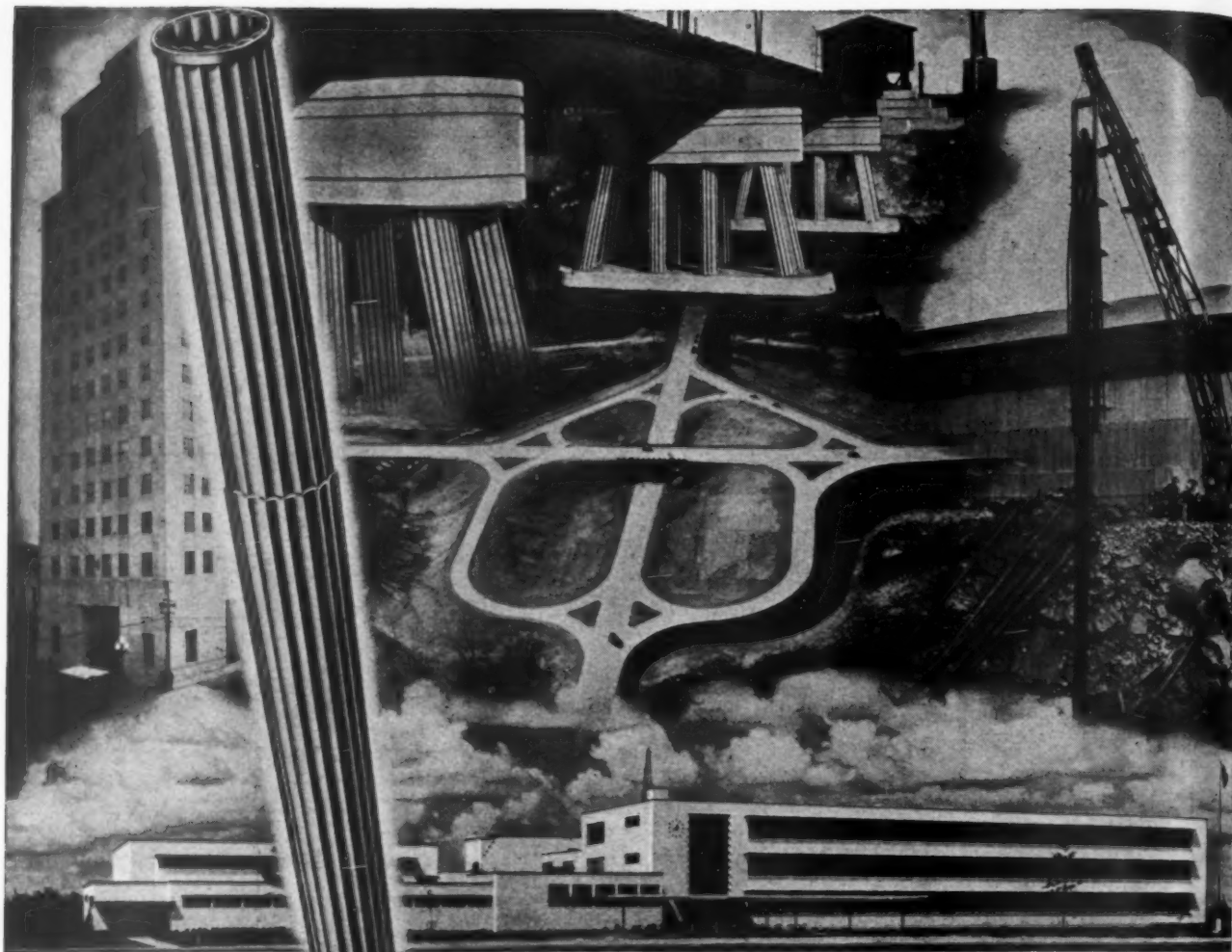
Schramm met all requirements because it could furnish the necessary air speedily—and the unit was lightweight and com-

pact and thus easily towed about. This represented a big saving in hauling costs—plus plenty of action.

Many features contribute to "air-when-you-want-it" Schramm Compressors: (1) Completely water cooled to provide ideal performance both winter and summer. (2) Seven main bearing supports. (3) Mechanical intake valve. (4) More cylinders and lighter parts. (5) Forced feed lubrication.

If you are not already using a Schramm Air Compressor, it will pay you to write today for illustrated Bulletin 42-PA.

SCHRAMM INC. **THE COMPRESSOR PEOPLE**
WEST CHESTER
PENNSYLVANIA



Many of America's
Biggest Projects are
"Based" on
MONOTUBES...

NO matter what the job, Monotubes assure engineers and contractors *speed with safety* in the installation of cast-in-place concrete piling.

Sturdy and rigid, yet light in weight and easy to handle, these all-steel, tapered, fluted pile casings take much of the guesswork out of foundation construction.

Monotubes require no heavy core or mandrel and can be driven with average job equipment; their hollow, tubular design permits easy, thorough inspection prior to concreting; and Extendible Monotubes are available for the installation of varying pile lengths.

Available now for war construction and, after the war, for all construction, in a gauge, size, and taper to meet all requirements. Write for Catalog 68A. The Union Metal Manufacturing Company, Canton 5, Ohio.

UNION METAL

Monotube Pile Casings

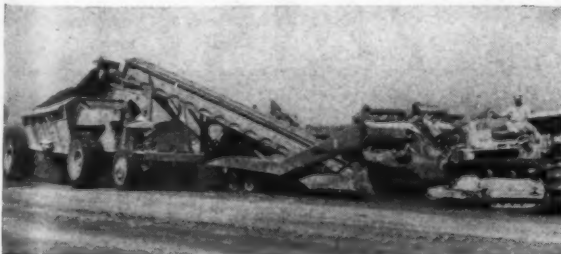
NOW! Load Dirt Faster

At Lower Cost with the MODEL BV EUCLID LOADER



COORDINATED CONTROL

All Loader operations are controlled by the tractor operator thus coordinating loader and tractor movement. Hydraulic control levers are mounted within convenient reach for instant control of the belt, angle of cutting blade, and the depth of cut for varying conditions.



● This new earth moving tool has a wide range of usefulness and can load practically any material, from loose sand to hard clay and shale, faster and in a shorter travel distance. In almost constant operation for a year and a half, the EUCLID LOADER has definitely proved its superiority over other mobile loading equipment—it is a "post war product" ready for your use on today's important earth moving jobs!

One important feature of the LOADER is its ability to make wide, level cuts and leave a smooth borrow area. The wide cutting blade with a plow point cuts through irregular surface contours and maintains maximum and steady output of material to the carrier belt for faster loading.

Send for your copy of Folder BV-400 which contains illustrations and specifications of this new type of mobile loading unit.

The EUCLID ROAD MACHINERY Co.
CLEVELAND, OHIO

EUCLID

SELF-POWERED
HAULING EQUIPMENT
For EARTH ROCK COAL ORE





WHEN MARCH FLIPS A COIN

YOU'RE READY FOR ANY MAINTENANCE JOB
WITH **WALTER SNOW FIGHTERS**

"The March wind doth blow and we shall have snow", says the poet. Yes—and rain, and thaws, and floods—for March is a tough month on highway maintenance.

But these tough maintenance jobs are "right down the alley" for Walter Snow Fighters. The unfailing four-wheel power-plus-traction provided by Walter Four-Point Positive Drive is unmatched for ramming heavy snowdrifts—freeing pavements of hard-packed snow and ice—scraping dirt and gravel roads after

rainstorms—or pulling heavy loads through snow, mud, sand, ruts, or up stiff grades, without bogging down, slipping or stalling.

Yes, there's no "off-season" for these rugged, powerful units. Wherever running conditions are at their worst, you'll find Walter Snow Fighters performing at their best. Write for full details.

WALTER MOTOR TRUCK COMPANY
1001-19 IRVING AVE., RIDGEWOOD 27, QUEENS, L. I., N. Y.



ROADS AND STREETS, March, 1944

WALTER
SNOW
FIGHTERS



Until our boys return victorious, WARCO continues to go "all out for war," and, like all thinking people, we go along in the realization that when our fighting men do come back, it's up to us here at home to have planned well that each returned soldier may have "his place in the sun."



Hydraulic Scoops for fast, economical earth moving

*Buy
War
Bonds
and
Stamps*



Hydraulic graders for road building and maintenance

WARCO manufactures "Better-Built" construction machinery for present day super-construction jobs. For constructing and maintaining modern highways; for fast, economical results on large earth moving jobs; for quick, satisfactory rolling and patch work, WARCO machines are unsurpassed.



Quick-Transport Machines for rolling and patch work.

Operators of WARCO hydraulic controlled motor graders and WARCO-DUPLEX hydraulic scoops are enthusiastic over the ease with which they can be operated, and with the work that can be accomplished through rapid, accurate, dependable hydraulic control.

These machines available now only on WPB release or approval—but ready when you can buy and we can sell to you.

W.A. RIDDELL CORPORATION, Bucyrus, Ohio

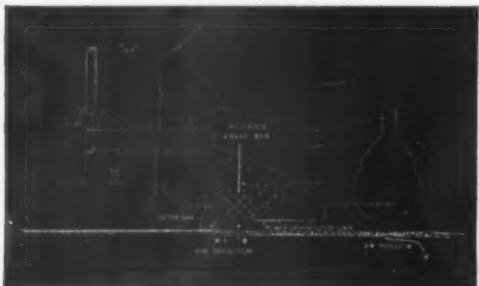
ROADS AND STREETS, March, 1944



Continuous RIBBONS OF RESPONSIBILITY



Drawings show how even a big movement of the wheel is smoothed out at points X on first course and XI on second course.



As the last smooth run is being completed by a Foote Adnun paver, two shiny black continuous ribbons appear briefly—a trademark to signal the completion of the job. It is almost as if the machine itself were saying: "There you are boys, smoothly finished!"

These ribbons actually are the marks of the two rear rollers, that appear only after the mix has been put down with a paperlike smoothness and finish. They disappear completely with rolling.

It is important to note that Adnun rollers *do* run on the finished surface, because it is this feature of Foote design which provides a smoother finish. We call it "Continuous Course Correction."

Note in the two diagrams how the Adnun wheels and rollers reduce irregularities to insignificance. A large movement at the wheels is changed into a very small one at the cutter bar. With each successive course, the smoother the surface becomes.

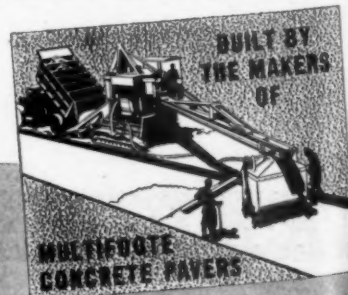
Identify Adnun quality performance by these marks of a smooth job. Continuous Course Correction produces a smooth surface whether the machine is laying Black Top, or crushed rock, slag, or gravel.

THE FOOTE CO. INC. NUNDA, N. Y.



ADNUN
TRADE MARK REGISTERED
BLACK TOP PAVER

WITH CONTINUOUS COURSE CORRECTION



Keep Your Lubricants *Clean!*

Dirt and grit and similar abrasives which are allowed to creep into the lubricant to grind and damage your equipment, are Fifth Columnists.

They are often the causes of failures for which something else is unjustly blamed. Guard your vitally important excavator against such **preventable** operating interruptions. Keep it working for victory.

THESE SIMPLE PRECAUTIONS WILL INSURE CLEAN LUBRICANTS:

1. Be sure oil and grease comes to you clean.
2. Keep lubricants covered and stored neatly in a clean place.
3. Drain oil enclosures when hot so the draining oil carries off the sludge.
4. Keep funnels, plugs and oil spouts clean. Wipe off oil can covers before removing.
5. Keep empty containers that are to be refilled clean and tightly covered.
6. Clean enclosure covers before removing for inspection.
7. Clean outside of grease gun before using.
8. Clean fittings so that grit is not forced in with grease.
9. Be sure gun is thoroughly cleaned before changing type of grease.
10. Keep your machine clean always.

Bucyrus-Eries are the finest excavators that modern engineering can build. Good lubrication regularly, carefully and cleanly applied will protect their easy, smooth, high speed operation in the vital tasks they are performing in winning the war.



Bucyrus-Erie

SOUTH MILWAUKEE, WISCONSIN, U. S. A.

ROADS AND STREETS, March, 1944

IT'S A FINE PIECE OF THE PIE

- if your
machinery
is right!



Cedarapids
Built by IOWA

be
Sure it's

No matter who you talk to — no matter what combination you use, the figures for the future of construction add up to big ones.

All construction begins with aggregate, and considering that a part of the percentage of the "plant and equipment" figure should be included with "aggregate quarrying," over 8% of the highway dollar goes into aggregate production.

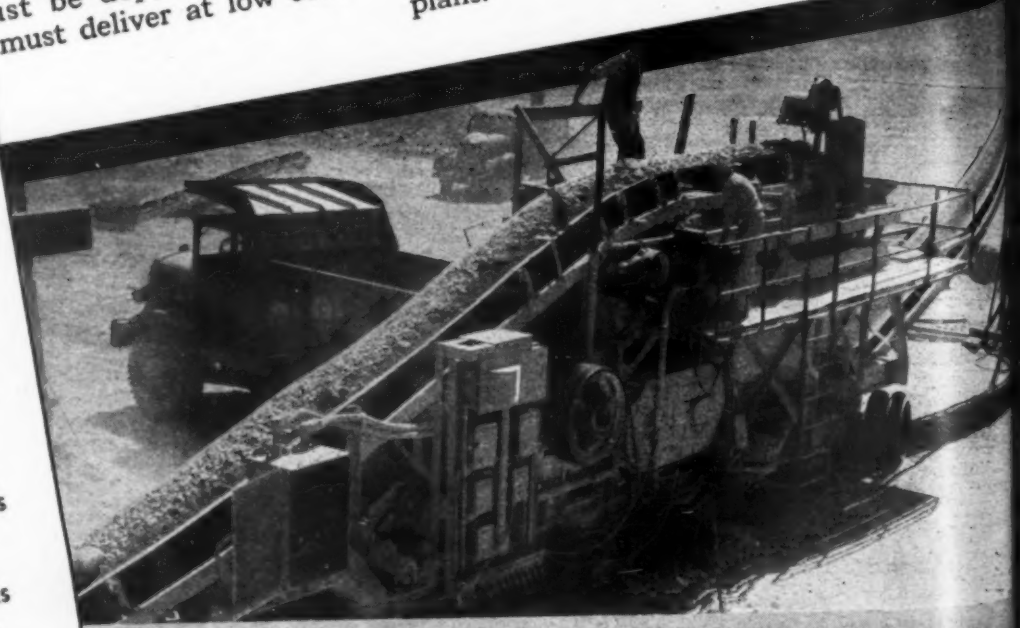
Aggregate is basic! Not another machine on the job can turn a wheel until the aggregate is available! Aggregate machinery must be dependable, and must deliver at low cost.

It is machine dependability and high production at low cost that has made Iowa the Headquarters for aggregate producing equipment. Check the names of Iowa owners! Check the output records! Check the number of machines Iowa ships as compared with others! These are the things that prove that big names, big jobs and "Iowa" go together. These are the things that guarantee that Iowa equipment will give you more than you ask on your future contracts. It is a nice piece of pie, and there will be profit in it if you are Iowa-equipped. We'll be glad to help you with your plans.

THE IOWA LINE

of Material Handling Equipment
Includes

- ROCK AND GRAVEL CRUSHERS
- BELT CONVEYORS — STEEL BINS
- BUCKET ELEVATORS
- VIBRATOR AND REVOLVING SCREENS
- STRAIGHT LINE ROCK AND GRAVEL PLANTS
- FEEDERS — TRAPS
- PORTABLE PLACER MACHINES
- PORTABLE POWER CONVEYORS
- PORTABLE STONE PLANTS
- PORTABLE GRAVEL PLANTS
- REDUCTION CRUSHERS
- BATCH TYPE ASPHALT PLANTS
- TRAVELING (ROAD MIX) PLANTS
- DRAG SCRAPER TANKS
- WASHING PLANTS
- TRACTOR-CRUSHER PLANTS
- STEEL TRUCKS AND TRAILERS
- KUBIT IMPACT BREAKERS



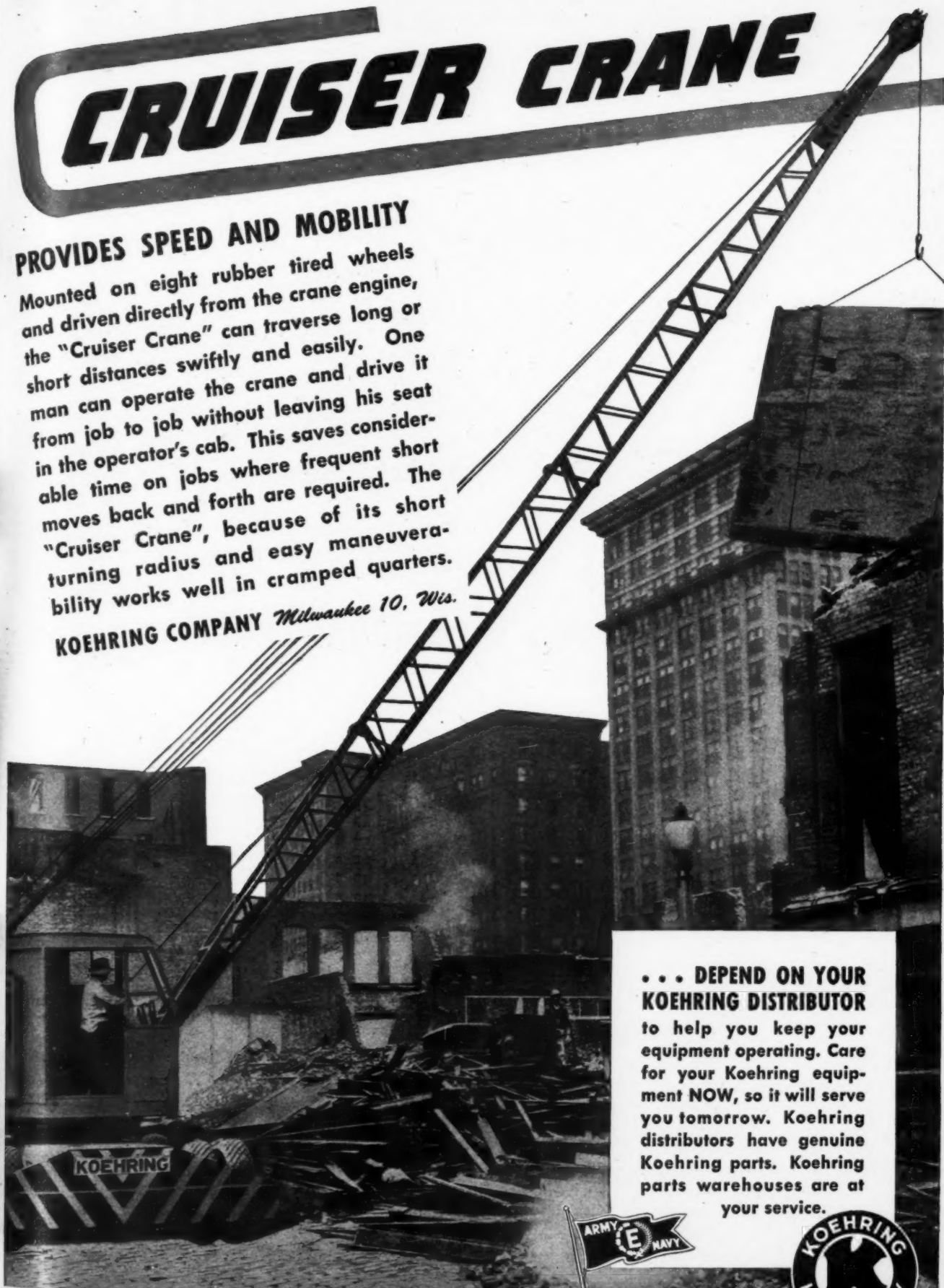
IOWA MANUFACTURING CO., CEDAR RAPIDS, IOWA

CRUISER CRANE

PROVIDES SPEED AND MOBILITY

Mounted on eight rubber tired wheels and driven directly from the crane engine, the "Cruiser Crane" can traverse long or short distances swiftly and easily. One man can operate the crane and drive it from job to job without leaving his seat in the operator's cab. This saves considerable time on jobs where frequent short moves back and forth are required. The "Cruiser Crane", because of its short turning radius and easy maneuverability works well in cramped quarters.

KOEHRING COMPANY *Milwaukee 10, Wis.*



... DEPEND ON YOUR KOEHRING DISTRIBUTOR

to help you keep your equipment operating. Care for your Koehring equipment NOW, so it will serve you tomorrow. Koehring distributors have genuine Koehring parts. Koehring parts warehouses are at your service.



HEAVY-DUTY CONSTRUCTION EQUIPMENT

ROADS AND STREETS, March, 1944



ASPHALT to the rescue of war-worn highways

● Terrific wartime wear and tear on arterial highways, long overdue for repairs, have now reached a point that presents a serious menace to the vital rolling equipment—cars, trucks, buses, tires—transporting war workers and war materials over these routes.

Thoroughly awake to this situation, alert highway engineers, commissions, and departments are recognizing *asphalt* as the immediate and ready solution for repairing and resurfacing these important arteries.

Stanolind Asphalt is the answer from the standpoint of speed in getting the work done. For every hour saved is a factor in conserving vital transport equipment. Surfacing half the highway at a time permits uninterrupted flow of traffic. And the new surface is ready for traffic in a few hours.

Stanolind Asphalt is the answer from the standpoint of ready convenience, utilizing regular asphalt road-building equipment which many contractors have available.

Stanolind Asphalt is the answer, too, from the standpoint of a sound, safe surface equal to the original construction. And from the standpoint of low cost—

laid right over worn brick, concrete, or asphalt roads—asphalt resurfacing is the logical and unquestioned solution to the current highway maintenance problem.

The help and experience of Standard Oil Asphalt Representatives are at the service of highway departments and contractors, in carrying out any highway resurfacing program. Write Standard Oil Company (Indiana), 910 S. Michigan Ave., Chicago 5, Illinois. In Nebraska, write Standard Oil Company of Nebraska at Omaha 2.



Time and Labor-saving Method of Asphalt Resurfacing Where modern equipment and methods are used, asphalt resurfacing can be done rapidly with little

manpower, and without interruption to traffic while work is in progress.

Work can be speeded by the use of asphalt finishing machines which lay hot mixed asphaltic concrete delivered from a central mixing plant by truck.

Half of the highway can be resurfaced at one time, which leaves one lane open for traffic. The resurfaced portion is ready for use within a few hours.

The general steps in construction are as follows:

Spot Patching—Where the old highway is badly broken, holes are patched by filling with the same mix as used in the binder course.

Prime Coat—This is a thin coat of cut-back asphalt spread over the old road surface and the patches that have been brushed clean. When used, it helps to bind the asphalt to the old surface.

Binder Course—An asphalt-aggregate mix is delivered hot from the central mixing plant to an asphalt finishing machine and laid from 2 to 3 inches deep over the old road surface and patches.

Wearing Course—This is the top course composed of asphalt, stone, and sand. It is also mixed hot at the central mixing plant and laid by machine. This top course presents a smooth, waterproof, long-wearing surface which requires no seal coat or stone application.

Oil is Ammunition—Use it Wisely

STANDARD OIL COMPANY (INDIANA)

**STANDARD
SERVICE**



The contractor who will be doing the big jobs tomorrow is looking beyond today's horizon. He is making his plans for the future when competition will be keener and jobs will have to be figured more closely. The new methods of doing things brought about by the war will necessitate the most modern equipment you can buy. LIMA will be ready to serve you in this respect with a line of Shovels, Draglines and Cranes that have established material handling records on war jobs all over the country - jobs that were done at top speed and with maximum efficiency.

Investigate LIMA Shovels, Draglines and Cranes Today.

LIMA LOCOMOTIVE WORKS, INCORPORATED

Shovel and Crane Division

LIMA, OHIO

NEW YORK, N. Y.	PHILADELPHIA, PA.	NEWARK, N. J.	MEMPHIS, TENN.	ST. LOUIS, MO.
DALLAS, TEXAS.	PORTLAND, ORE.	SEATTLE, WASH.	MINNEAPOLIS, MINN.	
SAN FRANCISCO, CALIF.	LOS ANGELES, CALIF.	SPOKANE, WASH.		
MONTREAL, Quebec, Can.	VANCOUVER, B. C.			

*Buy War
Bonds and Stamps*

LIMA

CRANES, 13 TONS TO 100 TONS

SHOVELS, $\frac{3}{4}$ YARD TO 5 YARDS

DRAGLINES - VARIABLE



500 Feet of Air on Wheels

Hundreds in world-wide use have proved the smoothness, economy and sturdiness of CP's 500-ft. Diesel-driven portable air compressor. Its exceptional smoothness is the result of the fine, inherent balance of the true V-8 arrangement of the compressor cylinders, and the use of a 6-cylinder engine. The compressor is of the two-stage, air-cooled type; the engine is the

Caterpillar D-13000 Diesel.

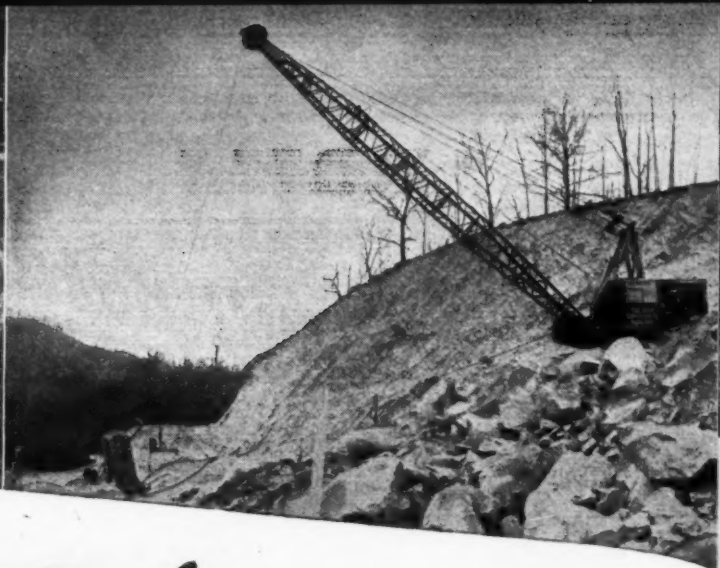
Incorporated also are the well-known CP features: gradual speed regulation . . . Simplate Valves...pressure lubrication...self-adjusting clutch . . . spring suspension and automotive steering. CP Portable Compressors are available also in sizes of 60 to 315 c.f.m. gasoline or Diesel powered. Write for complete data.

★★★★★★★
PNEUMATIC TOOLS
ELECTRIC TOOLS
(Hicycle...Universal)
ROCK DRILLS

CHICAGO PNEUMATIC
TOOL  COMPANY

General Offices: 8 East 44th Street, New York 17, N. Y.

★★★★★★★
AIR COMPRESSORS
VACUUM PUMPS
DIESEL ENGINES
AVIATION ACCESSORIES



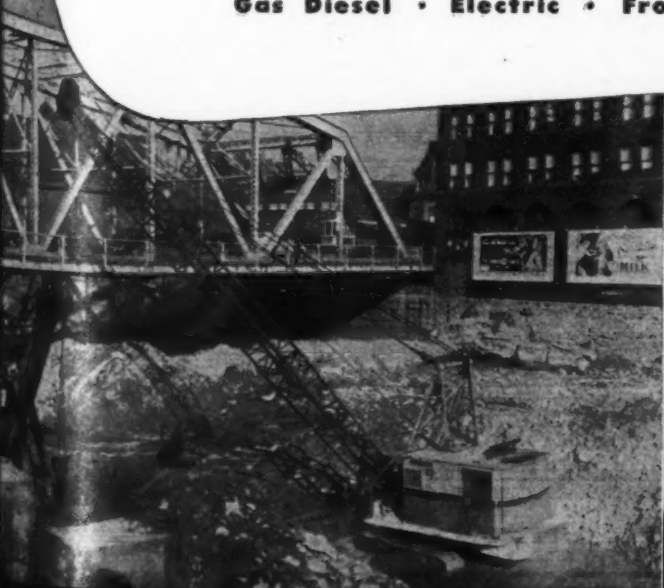
MARIONS *have* **STAMINA**

**FOR THE TOUGHEST ROAD BUILDING
AND HEAVY CONSTRUCTION PROJECTS**

IT PAYS TO MODERNIZE WITH MARIONS



THE MARION STEAM SHOVEL CO.
MARION, OHIO, U. S. A. • Shovels • Draglines • Walkers
Gas Diesel • Electric • From $\frac{3}{4}$ cu. yd. to 35 cu. yds.



DRILL
*in any position
 and at any angle*



with the
CLEVELAND
 DR30

Pneumatic tires are now unobtainable except for armed forces; DR30 Wagon Drills are regularly supplied with steel wheels only.

★ By merely loosening two nuts, the Cleveland DR30 Wagon Drill can be swung forward or back and from side to side. Then set it as you wish—straight down, flat, breast high, higher than your head, within 4" of ground level, or even straight up. • Here are a few more important features of the DR30:

- ★ Feed capacity over 8 feet, handles depths to over 25 feet.
- ★ Recoil device holds machine to its work, increases drilling speed 10-25%.
- ★ Forward leg point holds the drill and steel in line on all kinds of holes.
- ★ Centralizer keeps steel from "walking" when starting hole, prevents breakage of bit points.

★ Twin jack-screw mechanism permits easy moving of U-bar, shortens set-up time.

★ Main wheels swivel 90° for line drilling, and 180° to obtain narrower tread.

Write for Bulletin 132 that fully describes the most popular wagon drill ever built.

BRANCH OFFICES

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CANADIAN DISTRIBUTORS

Purves E. Ritchie & Son, Ltd., 658 Hornby Street, Vancouver, B. C.

BUY U. S. WAR BONDS AND STAMPS

THE CLEVELAND ROCK DRILL COMPANY

Division of The Cleveland Pneumatic Tool Company

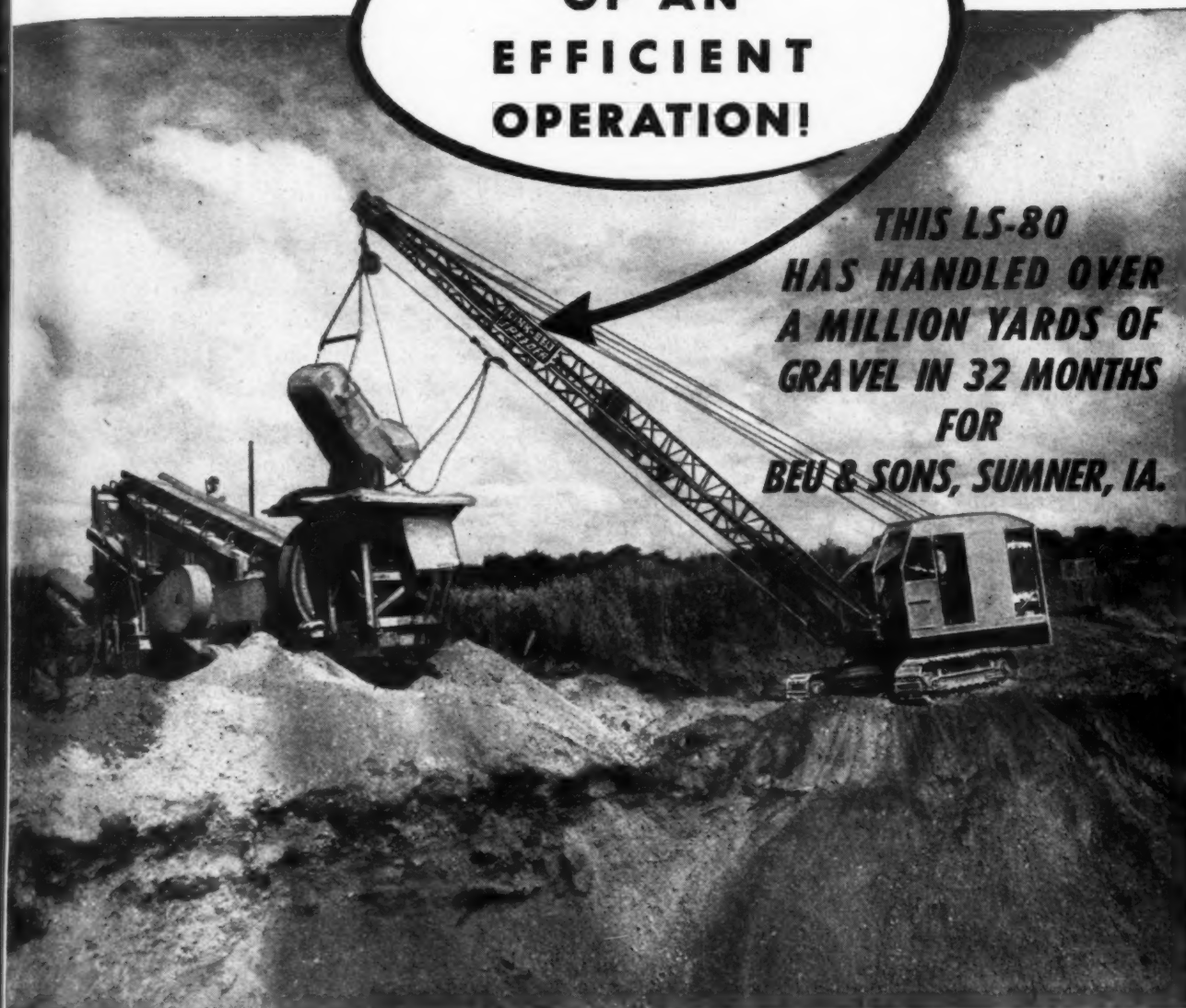
CABLE ADDRESS: "ROCKDRILL"

CLEVELAND 5, OHIO

LEADERS IN DRILLING EQUIPMENT

**A SURE SIGN
OF AN
EFFICIENT
OPERATION!**

**THIS LS-80
HAS HANDLED OVER
A MILLION YARDS OF
GRAVEL IN 32 MONTHS
FOR
BEU & SONS, SUMNER, IA.**



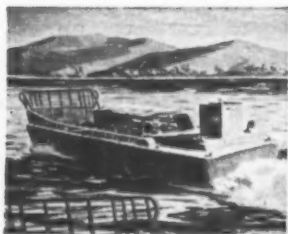
★ BUY BONDS
AND ★
MORE BONDS

Contractors all over the United States have found that there is extra profit in the extra strength and stamina built into these finger-tip operated machines. They are engineered for long, maintenance-free service and are giving that service even under the stress of war-time strain. There are 25 different models available—a type and size to fit every job.

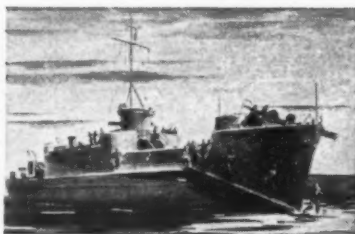
LINK-BELT SPEEDER

Builders of the Most Complete Line of
SHOVELS-CRANES-DAGLINES

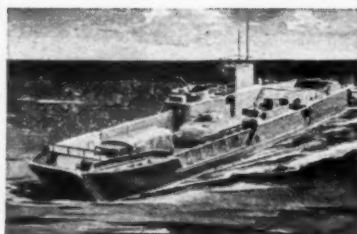
LINK-BELT SPEEDER CORPORATION, 301 W. PERSHING ROAD, CHICAGO-9, ILL.
(A DIVISION OF LINK-BELT COMPANY)



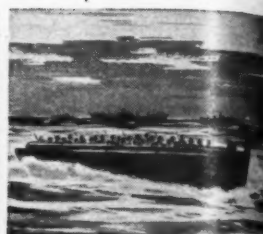
LCM (Landing Craft Mechanized) 50 ft.



LCI (Landing Craft Infantry) 157 ft.



LCT (Landing Craft Tanks) 105 ft.



LCV(P) (Landing Craft Vehicle Personnel) 36 ft.

America's Fighters move in - with GM DIESELS

IN the face of enemy fire these remarkable invasion boats nose in on enemy shores and pour out America's tough fighters and fighting equipment.

They move on split-second orders—must get in and out again by themselves—on the dot, come hell or high water.

It's the kind of service that calls for utmost re-

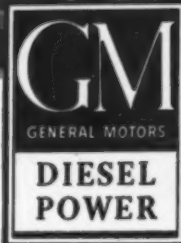
liability, maneuverability and quick response.

In these capable craft—from the 36-foot LCV(P) to the big 328-foot LST—you find the engines America and our Allies know so well, General Motors Diesels.

To these engines are assigned the jobs that call for the greatest dependability the engine world knows.



LST (Landing Ship Tanks) 328 ft.



ENGINES . . . 15 to 250 H. P. . . . DETROIT DIESEL ENGINE DIVISION, Detroit, Mich.
Engines of this series power the LCI and all the smaller landing craft

LOCOMOTIVES ELECTRO-MOTIVE DIVISION, La Grange, Ill.
Engines from this Division propel the giant LST vessels

ENGINES . . . 150 to 2000 H.P. . . . CLEVELAND DIESEL ENGINE DIVISION, Cleveland, Ohio
More than 40 types of Navy vessels are powered by engines of this Division

Now available in
larger quantities*

UNIT SHOVELS and CRANES in various capacities



★ Why larger quantities? Because we have been able to divert more of our facilities from the production of Essential War Weapons to the production of Unit Shovels and Cranes... Essential War Implements. Of course, as implements of war, Unit Shovels and Cranes cannot be purchased without proper governmental authorization but we are preparing, at present, for the day when we will again be able to satisfy your home front shovel demands.

The quality of Unit Shovels and Cranes is still tops. The successful combination of design and construction features that has made them superior in the past—including the modern one-piece cast gear case that encloses all machinery on rotating frame, and permits it to operate in a bath of oil, resulting in low cost maintenance and long life; the interchangeable disc-type clutch, which assures even wear and smooth pick-ups; and the safe patented traction brakes that disengage automatically on both crawlers when power is applied—is, and will continue to be maintained.

Included in the increased production schedule are the two time-tested favorites, Models 514 and 1020.

THE 514 Shovel weighs 24,000 pounds and has a capacity of $\frac{1}{2}$ yard; crane capacity is 5 tons. It possesses all of the power of a heavy-duty machine, yet, because of its light weight, can be manipulated with extreme accuracy and speed.

THE 1020 Shovel is a heavy-duty, $\frac{3}{4}$ yard model weighing 35,000 pounds; crane capacity is 10 tons. It is rigidly constructed for years of dependable and economical service. It is light enough for high-efficiency, speed and responsiveness but has the solid brawn and power necessary for heavy-duty performance.

Free Booklets

A series of bulletins, containing detailed information of these and other models of Unit Shovels and Cranes, has been prepared and will be sent to you, without cost or obligation, upon request.



* The Reason Why More Unit Shovels Have Not Been Available

We curtailed the production of Unit Shovels and Cranes many months ago in order to devote most of our facilities to the construction of gun-mounts for the Oerlikon 20 mm Anti-Aircraft Cannon shown in the accompanying photo. The protection that this weapon has provided for our ships has proven indispensable.



UNIVERSAL UNIT MACHINERY CORP.
6413 W. BURNHAM STREET • MILWAUKEE, WISCONSIN

"I was one of the wise guys!"



"Nuts," I used to say to this Mack salesman. "I should pay you more for a truck when I can get another kind cheaper? So what if it ain't as good? I run the hell out of it—then I buy me a new one. That way I'm ahead of the game and I always got a new truck, see?"

I was a smart apple, I was. Yeah.

Now look at me—right behind the eight-ball. Sure I still got a truck and I'm stuck with it for the duration! What that junkheap is doing to me shouldn't happen to Hitler.

And that ain't all. That brother-in-law of mine, Benny, he bought a Mack 'way back, and he ain't letting me forget it for a minute.

You shoulda heard him last night. "Just like I always say," he crows. "You pays your money and you takes your choice. Now you take that Mack of mine. That baby's been over a hundred thousand miles and I ain't had the case down yet. Never missed a trip, and what's more, the way she's running, I know I ain't going to!"

Personally, I still think somebody dropped Benny on his head when he was a baby. But here lately, I'm beginning to think it didn't do him no harm.



Mack Trucks, Inc., Empire State Building, New York, N. Y.
Factories at Allentown, Pa.; Plainfield, N. J.; New Brunswick,
N. J. Factory branches and dealers in all principal cities for
service and parts.



Mack

TRUCKS

FOR EVERY PURPOSE

ONE TON TO FORTY-FIVE TONS

BUY U. S. WAR BONDS

IF YOU'VE GOT A MACK, YOU'RE LUCKY...IF YOU PLAN TO GET ONE, YOU'RE WISE!

ROADS AND STREETS, March, 1944

ROADS AND STREETS

March, 1944, Vol. 87, No. 3

170-Machine Grading Outfit Whipped Six-Million-Yd. Airport Job

How Frank Mashuda and Ralph Myers divided up exceptionally heavy runway grading job, 65% rock and coal, with 85-ft. maximum cut and 90-ft. fill

WHEN Nature carved the hills around Pittsburgh, Pa., she didn't leave any nice level airport sites. The best available location for the new CAA-financed Moon Township Airport proved to be a rolling dairy farm area, which would require 6 million cubic yards of excavation to level for a standard 3-runway layout.

Borings and test pits revealed, moreover, that this project would be a tough shooting-and-shovel job; under ten to twenty feet of scraper dirt lay hardpan, limestone and shale—over 3½ million yards of it—plus 300,000 cu. yd. of coal and “crop.”

Such was the job that the contractor team of Frank Mashuda Co. of Milwaukee and Ralph Myers of Salem, Ind., moved onto during April,

By **HAROLD J. McKEEVER**
Editor, Roads and Streets

1942, with orders to show all possible speed. How they handled this big yardage is of special interest because both firms are rated as “tops” among smart dirt movers, and because they each took certain definite parts of the job while cooperating with each other generally to speed up the work.

General Grading Strategy

Mashuda and Myers each mapped their strategy in as much detail as uncertainties permitted. They had roughly eight main cut areas to work from, mostly around the outer part of the field. Three fills at runway ends lay immediately outside heavy cuts. But the big fill areas con-

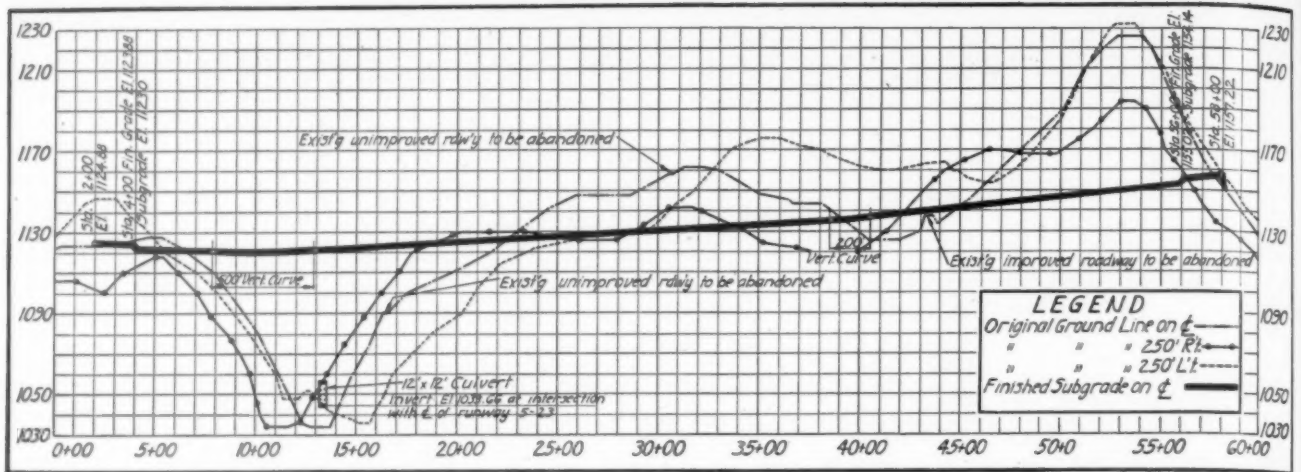
sisted of the 100-acre central portion of the field with fill depths up to 20 ft., and a 2,500,000 yd. fill of 90 ft. max. height, needed to carry two runways across a creek bottom at the southwest corner. The heaviest cut and deepest fill were at the opposite ends of the 5,500-ft. NE-SW runway.

The general beginning scheme was to first open up cuts around the field perimeter, from which runway end fills were built up, the surplus material going to the middle area. Specifically:

Mashuda took the biggest cut, in the northeast corner, which involved 1,800,000 cu. yd., 60% rock. He dumped near the center at first. Then, beginning in June after farm structures had been cleared and a large culvert built, he began moving mate-

How to keep 170 pieces of earth-moving equipment rambling without traffic snarls was a chief problem with Frank Mashuda and Ralph Myers on the Moon Township job. Tournapulls on the mile-long haul road between the biggest and deepest fill





Profile of runway 5-25, showing unusual depths of cuts and fills required in leveling this job

rial past the center of the 90-ft. fill at the southwest corner, with a mile average haul. Contours along the haul axis were such that Mashuda's blade graders were able to smooth a fairly straight haul road involving light gradients.

Myers tackled a 75-ft. glide-angle-clearance cut at the southwest corner, hauling inward along a runway axis. The two outfits tailed together over the big fill near the intersection of the E-W and NE-SW runways.

At the same time Mashuda worked out a central cut toward the big southwest fill. Myers took a cut at the south edge. All four above operations proceeded simultaneously for a time.

As the job progressed and the big central area was brought up to grade, shovels moved in on a 1,500,000-yd. glide angle cut beyond the east end of the east-west runway. Over 300 tons of coal and crop came out of here, the coal being sold by the country.

Usual scraper methods were employed to remove the stockpiled topsoil from all cut and fill areas, the soil being heaped at designated spots of no-cut-or-fill, out of the scraper paths, to be spread for seeding after completion of the paving.

12x12 Arch Culvert Rushed

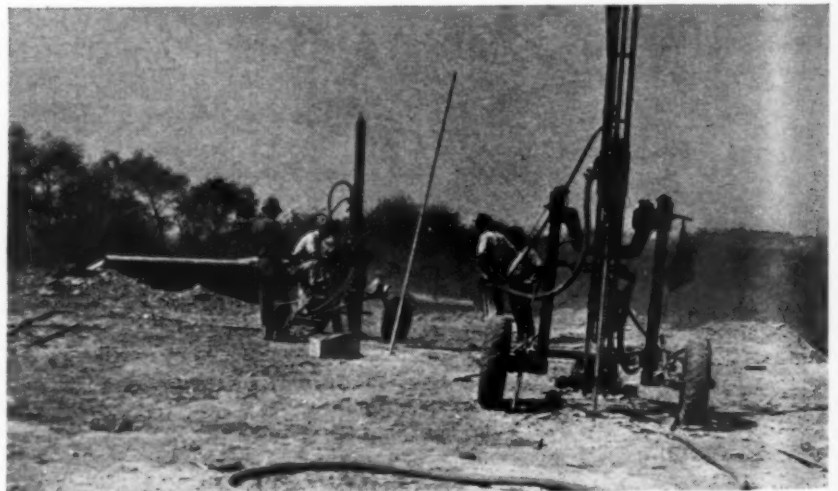
The big 90-ft. fill might have been a very serious bottleneck, except that a 12x12x1,300 ft. concrete culvert under this fill was rushed in double-quick time. The owner of a famous dairy farm here had until June 1 to vacate, and in the 60 days through April and May sub-contractor A. R. Coffeen of Davenport, Ia., completed this 7,000 cu. yd. concreting job ahead of schedule.

Mashuda and Myers both dumped

light fills in hollows of the deep fill area during this period. Then on completion of the culvert they began at the valley bottom, each filling and rolling on one side of the culvert and expanding the fill width as they came up.

Tricks Saved Weather Delays

For a while the combined outfits moved 50,000 cu. yd. a day, working four 5-hr. shifts with an hour intervals for greasing and servicing ma-



(Above) Four crews did nothing but shooting, aided by 18 compressors and wagon drills



(Left) Coal! Thousands of tons of it, was a by-product on the Mashuda workings. Easy stuff for heavy-duty shovels, and some of the upper strata or "crop" was moved with scrapers

Gangway for another "train load" of coal

(Below) Nearly 4,000,000 cu. yd. of rock excavation kept nine shovels busy. Almost every type of heavy wagon was pressed into service



chines. Progress during the season was aided greatly by four factors:

1. Good spring weather.
2. The large area of work often permitted shifting equipment to drier areas after rains until soft ground dried sufficiently. Six hundred of the 1,140 acres in the site were used as the contractors' working area.
3. More frequently when soft areas were not workable after a rain the contractors peeled up 5 or 6 in. of top mud, wasted it at the nearest spoil area, and slammed ahead with scraper hauling. They almost never stayed idle waiting for a fill to dry. This trick of "putting dirt over the hill" at the contractor's own expense was one which Myers had found profitable on the big Muskingum Dam job near Zanesville a year or two before.
4. Fills were kept well graded, compacted and crowned at all stages, so that there was minimum difficulty in getting them in shape after rains.

Actually rains often helped speed the work. Because of an exceptionally dry season a common difficulty was to keep enough moisture in the grade for optimum compaction. Work was sometimes held up while sprinklers hauled from scattered dammed-up springs and small creeks. Two storage tanks, made from salvaged rail-road tank car, aided the 4 to 10 tank trucks.

How Fills Were Widened for Taxiways

Late in 1942 when the original grading contract had been completed it was decided to extend taxiways to the ends of all runways. This necessitated some 500,000 cu. yd. additional excavation (included in the 6,000,000 total), which Mashuda undertook alone under a supplemental agreement to the original contract.

In widening fills the usual procedure was followed of stripping top soil out to the new slope stakes and beveling the new fill layers into the existing slope. Where cuts were widened the outfit didn't "wade into the

hill" but stripped topsoil and benched downward with scrapers (or shovels).

Notes on Grading Methods

A fleet of ten 30-yd. and seven 16-18-yd. scrapers carried the load on stripping and earth moving, with seven Tournapulls operating on longer hauls. The latter (with pushers) were especially useful on the 5,000-ft. NE-SW haul. Scrapers and dozers working downhill roughed out the 5 to 1 cut slopes along the E-W runway and the 40 to 1 glide-angle slopes beyond the 5 and 9 ends, the final dress being given by motor graders moving along the contours.

The 10 to 20 ft. of top earth was "pie" at first, but became progressively harder each layer down. Most of the scraper dirt required push tractors.

Then a limestone and silt stone roof was encountered, followed by coal and fireclay.

Principal Heavy Equipment Used by Mashuda and Myers

- 49—D8 tractors (dozers, pushers, pullers)
- 3—2½ yd. shovels (2 Northwests, 1 Bucyrus-Erie)
- 1—2 yd. shovel (B.-E.)
- 2—1½ yd. shovels (B.-E.)
- 1—1½ yd. shovel (Marion)
- 2—1 yd. shovels (another owner—used on coal) Marion
- 7—Tournapulls
- 13—bottom dump Euclids (12 yd.)
- 4—end dump Euclids (12 yd.)
- 8—side dump Athey (12 yd.)
- 10—LaPlante Choate 30-yd. scrapers
- 7—LeTourneau 16-18-yd. scrapers
- 8—12-yd. LeTourneau scrapers (supplied by Army)
- 3—3-drum sheepsfots
- 4—2-drum sheepsfots
- 8—3-wheel rollers (10-ton)



Heavy pneumatic roller, used in subgrade compaction along with other types of compaction equipment



Placement of base slag was expedited by building up dump bodies with sideboards, to get maximum delivery from available trucks



Power broom outfit, used to choke slag base



Surface and binder course crews "never spoke to each other." See article

- 6—grease trucks with compressors
- 3—welding trucks
- 4—field shops (2 for each contractor)
- 10—blade graders
- 10—water wagons
- 5—7-yd. Sterling trucks—end dump

Of interest is that the combined grading outfit was 100% diesel except for several Sterling gasoline trucks.

Rock Excavation

No unusual methods of rock excavation were employed—just steady shovel work, with nine shovels ranging from one to 2½ yd. loading 12-yd.

dump trucks of end, bottom and side dump types. A policy which paid dividends was to do unusually heavy-shooting to break the rock as thoroughly as possible. Forty per cent dynamite was used. The largest shot was 7,500 sticks. Four crews doing nothing but shooting, aided by 18 compressors and wagon drills, made fast time in rock cuts. The procedure was to lift out a whole section at one blast, and move equipment in immediately on the next section.

30 Trucks Hauled Coal

Most of the coal was loaded out without blasting and hauled from the site by a fleet of 20 to 30 dump trucks. Top coal was moved partly with scrapers and pushers. Coal from one cut was sold by Allegheny County for \$80,000 and that from another was marketed as an unforeseen cash dividend by the contractor.

Fill construction was a highly variable task calling for the compaction of combinations of material ranging from 100% easy soil to mixtures of rock, fireclay and soil. (Most fireclay was wasted, but some was mixed in with rock fills.) Much of the time dump wagons and scrapers intermingled on the fills, which were kept leveled with dozers, sheepsfoots and 12-ton smooth rollers. After getting into rock, mixed fills presented some difficulty in compacting to the 9 to 12 in. layers specified.

Stone naturally interfered with blade operation, and even made it tough for dozers. One bulldozer did nothing but shove big stones into adjacent spoil areas. The grade foreman and inspector cooperated closely to keep the best possible proportions of stone, hardpan and earth coming in. Frequently heavy dozers had to help "process" or mix stone and soil material.

Although soil samples were taken all through the work most of the fill was too granular for usual soil control methods. The main criterion was compacted weight, which ranged from 130 to 150 lb. per cu. ft. in places. Compacted weight was made to approach that of the original material sampled in the cuts.

Before or early in the grading it was necessary to install culverts in several creek bottoms. These struc-

The Southeast or 5 runway end, looking along taxiway. Fill height, 90 ft. max. Several heavy fills and cuts were widened under a supplementary contract, made necessary by decision to extend parallel taxiway out to the ends of runways





Details of drainage box with removable precast concrete grating, as installed along edge of apron and some sections of the runways

tures, including the 12x12x1,300 ft. reinforced concrete culvert heretofore noted, and also several 36, 48 and 60-in. lines, represented \$360,000 of the original \$2,760,000 grading contract. Most of the smaller lines were placed before filling, the pipe being bedded along the stone creek bottom after channeling down a foot or two. One line was set by trenching 10 ft. into new filled material.

Subdrainage

In the spring of 1943 after comple-

tion of grading, a contract (\$330,000) was let to Sanctis Construction Co. for runway subdrainage involving 18 miles of pipe, 4 to 36 in. diam. This contract also included lighting ducts.

Black-Top Paving

Runways and taxiways were built under a separate \$1,076,000 contract by Allegheny Asphalt Paving Co. of Pittsburgh. Completed in 126 one-shift working days, this job included 355,000 sq. yd. of paving consisting of (1) a 2-in. bottom choke of rolled granulated slag, (2) 12 in. of No. 4 slag choked and rolled in three layers, (3) a 2-in. hot-mix plant-mix binder course, and (4) a 1-in. surface course of the same material.

Five black-top pavers were on the job, although at times only two were

in operation, one each on binder and surface course.

An interesting sidelight is that the binder and surface course crews "never spoke to each other." Since there was twice the volume of binder materials, the binder pavers had to put in more and steadier hours, often widely separated from the surface pavers.

Even the supply set-up was different for the two courses. For the surface course, slag unloading and asphalt hot-mix plants were erected at a siding $2\frac{1}{2}$ miles from the airport. Capable of handling four carloads of slag per hour and requiring 50 to 125 trucks hauling to the field. This material plant did a real speed job. Cars were brought in along a 44-car spur and bottom-dumped into an under-



Surface-course hot-mix was turned out in this plant. $2\frac{1}{2}$ miles from the airport. The dryer bin was loaded each night with a crane to step up daytime output

12 x 12 concrete culvert 1300 ft. long, shown under construction at point of deepest fill. (90 ft.)



track hopper, from which twin belts, each at 45° with the track, took the slag to portable overhead bins. An eccentric box unloader, which kept the belts uniformly full, was a helpful feature. As cars emptied they were kicked back along the main line and taken away.

Peak paving operations called for 150,000 tons of slag delivery daily. The contractor deserves much credit for this layout, which cost \$36,000 to erect from equipment already in his possession, before it moved a single car. The hotmix plant was kept at top capacity by loading the dryer bin each night with a crane.

Hot-mix binder material, on the other hand, was hauled 18 miles from the firm's permanent Pittsburgh plant, using 28 or more trucks.

After paving, top soiling and seeding were done by J. M. Eisler under a contract for \$96,000 covering 195 acres. This contract included seeding all cut slopes and straw mulching both cut and fill slopes.

U. S. Engineer Direction

Moon Township Airport represents one of the largest construction jobs completed to date with Civil Aeronautics Administration funds. The project was designed by the Pittsburgh district staff of U. S. Engineers, the contracting agency. Grading was largely completed under the Pittsburgh Engineer District office, after which the project was transferred to the Baltimore district for completion.

Construction Contracts Exempt from Renegotiation

Title VII of the Revenue Act of 1943, enacted over the President's veto on Feb. 25, constitutes a complete rewriting of the law on renegotiation of war contracts. There are several provisions which greatly relax procedure on construction contracts.

As pointed out in an A. R. B. A. bulletin, henceforth, any contractor whose government business aggregates less than \$500,000 for the fiscal year in question will be exempt from renegotiation (previous exemption, \$100,000). More important is that section of the new law which wholly exempts any construction contract

awarded as a result of competitive bidding. Likewise, any subcontract directly or indirectly under a construction contract is exempt.

All Cost Items Allowed. The original law was vague and confusing on "excessive profits." The new Act strengthens the statutory direction concerning exclusions and deductions by requiring allowance, as cost, of: "all items estimated to be allowable as deductions and exclusions under Chapters 1 and 2(e) of the Internal Revenue Code (excluding taxes measured by income) to the extent allowable to renegotiated contracts."

Court Review. Most significant of all are amendments which protect government contractors and subcontractors against capricious treatment by Price Adjustment Boards. Contractors have an express right to court review of past as well as future determinations of the Boards where voluntary agreement was not reached. Any contractor or subcontractor may petition the Tax Court for a trial within 90 days after the Board finally determines the amount of excessive profits; or if the Board fails to act within 150 days from date request is filed for review. A proceeding before the tax court is not to be treated as a review, but rather as an original trial. The Court has exclusive jurisdiction to determine whether the so-called excessive profits are less than, equal to, or greater than that determined by the Board.

New Board Established. In effect, the law gives statutory recognition to the Joint Price Adjustment Board by setting up a "War Contracts Price Adjustment Board" comprised of the same personnel except that a WPB representative has been added. Responsibility is placed solely in the hands of the newly created War Contracts Price Adjustment Board, although the Board has authority to delegate many functions. It may delegate functions to the Secretary of any Department, who in turn can redelegate agencies under him. The Board apparently will delegate freely, to preserve and immediately utilize existing departmental adjustment boards and sections.

"Secret Criteria" Outlawed. Many

have complained that determinations of Boards were made by "secret criteria" and the contractor involved was never apprised of methods and factors employed in arriving at conclusions. Such procedure is now outlawed.

Renegotiation on Overall Basis. The aggregate of all amounts received or accrued from renegotiable business during the fiscal year involved must be included. Exceptions permit substitution of a period other than the fiscal year by mutual consent, and separate renegotiation of individual prime and subcontracts at the contractor's request.

Time Limit Tightened. Renegotiation proceedings cannot be commenced later than one year after the close of the fiscal year in which the alleged excessive profits are received or accrue, or more than one year after the contractor files his required statement, whichever is the later. Termination of renegotiation must be made final within a year following commencement unless extended by mutual agreement.

Few Amendments Retroactive. Practically all amendments to the renegotiation law are effective only with respect to fiscal years ending after June 30, 1943, except (1) section dealing with review by the Tax Court which becomes effective with enactment of the law; and (2) the provisions for recomputation of closed renegotiations to reflect accelerated amortization of facilities, retroactive to April 28, 1942.

It is significant to note the similarity between the recently enacted amendments to the renegotiation law and recommendations of the A.R.B.A. which were presented to the Congress by Charles W. Smith, Vice Pres., the Highway Contractors' Div., and H. E. Wolfe of St. Augustine, Fla.

Traffic Deaths in 1943—Motor vehicle accidents in 1943 resulted in the deaths of 23,300 persons, and 800,000 injured, according to the National Safety Council. Of the injured 60,000 were left with some permanent impairment. The death toll is 42 per cent below the 1941 all-time high of 39,969.

Among those present at the recent Illinois State Paving Conference, Springfield, Ill.



H. B. Puller, general chairman; Walter A. Rosenfeld, Dir., Ill. Dept. of Public Wks. & Bldgs.; Herbert Spencer, Asphalt Inst.

Bernard E. Gray, Asphalt Inst.; Ernest Bristol, Asphalt Inst.; Prevost Hubbard, Asphalt Inst.

Roland Vokac, Berry Asphalt Co.; E. F. Kelly, U.S.P.R.A.

Contractors Will Be Ready!

. . . for the big post-war job

Ability of construction industry to re-equip and man itself quickly for 12-15 billion-a-year pace is asserted at A.G.C. annual meeting. Lag in plans preparation among topics aired, legislative problems, market development

AN industry fresh from the accomplishment of having built over a thousand runways, and access roads, industrial plants and other war projects in boom volume—12 billions in domestic war construction alone since 1941—should have little trouble swinging into action on even the boldest post-war public works program yet conceived.

In making this important assertion, construction leaders at the annual meeting of the Associated General Contractors of America, Inc. (Chicago, Feb. 7-9), at the same time aired several serious problems, both post-war and immediate.

Oscar B. Coblentz, president, outlined the huge dammed-up need for all types of construction, which will require at least 12 billion dollars the first year after the war and possibly 20 billions annually thereafter.

Too Much Equipment, or Too Little

Showing relatively little concern over a possible equipment surplus problem after the war, contractors see rather the problem of replenishing from the small volume of equipment now on hand in this country. Disagreeing with skepticism thrown out by Thos. H. MacDonald, Commissioner of Public Roads, as to whether the currently reduced contracting industry could absorb a big post-war program quickly, A.G.C. members foresee ample tools and organization capacity. Equipment needs not filled by army and navy surpluses can be quickly met by the greatly expanded construction machinery industry.

Another post-war "if" is the serious lag in advance engineering by state highway departments, according to Mr. MacDonald. Available federal planning funds are not being taken up fast enough by some states. The 34,000-mile interregional highway reconstruction job recently outlined to the President is the construction industry's real post-war frontier, he remarked. Speaking broadly, the one-third of the Federal aid highways that have carried the greatest concentration of war traffic are also oldest in design and construction.

F. W. Parrott, contractors' group chairman, WPB Advisory Committee on Used Construction Equipment,



At the A.G.C. meeting: H. E. Foreman, managing director; Wm. Muirhead of Durham, N. C., pres.-elect; Thos. H. MacDonald, Commissioner of Public Roads; Oscar B. Coblentz, Baltimore, retiring A.G.C. pres., and Hal H. Hale, executive sec'y of the A.A.S.H.O.

cited the industry's remarkable recent pace on airport work as an indication of its post-war volume capacity; gave figures on machinery manufacturers' increased production facilities; promised an eventual end of truck and heavy-duty tire shortage; told of an extensive A.G.C. survey of available equipment to be presented at Congressional road hearings soon.

The Association passed a resolution urging that (1) no government-owned construction equipment be "dumped" on the open market after the war; (2) that equipment be sold only on fair appraisal; (3) offered for sale only to manufacturers, dealers and recognized distributors; and that (4) distribution be made by the government agency owning or controlling the equipment.

War Construction Nearly Done, Says Gen. Reybold

War construction remaining to be done at home will be finished by mid-year, in fact most of it by April 1, said Maj. Gen. Eugene Reybold, Chief of Engineers, U. S. Army. About \$125,000,000 of work remained as of early February. With the emergency construction job done at home, and overseas bases and supply-line construction nearly done, he outlined the third phase, that of construction for invasion. To speed this phase every U. S. Army Engineer general service

regiment, special service regiment and separate battalion is being reorganized and re-equipped as an engineering construction battalion with greatly expanded equipment and skilled equipment operating personnel.

Contract renegotiation was discussed briefly again at this meeting, led by A.G.C. managing director H. E. Foreman. He told of an amendment to pending federal legislation which would exempt competitive bid construction contracts from re-negotiation, but warned that many contracts recently have been awarded after merely informal competition and that the term "competitive bid" may need clarifying. He urged contractors to present complete description of the nature of their work along with financial and cost statistics, and bring convincing arguments to bear as an aid in obtaining a just re-negotiation.

On the wage adjustment problem, the session felt that certain employees should be outside Wage Adjustment Board jurisdiction, including engineers and surveyors on site work, drivers of construction suppliers' trucks and shop mechanics fabricating materials for installation by their employing firm.

Toll Projects Advocated

Ample private funds for financing of sound self-liquidating post-war (Continued on page 72)



Redwood Road entering Salt Lake City, one of the 59 projects in Utah's 1942-3 access road program. This shows the widened 4-lane road

Notes on Utah's Access Roads

Methods and design details on typical projects in state's recent \$9,000,000 program

IN few communities has the war-born term "access road" meant so much as in the fertile region of central Utah.

Here in the midst of a people who had built an inland empire on irrigated farming, mining and tourist trade, Uncle Sam suddenly swooped down with \$600,000,000 worth of new ordnance plants, steel mills, air fields, army training centers, supply depots and mine developments. Scattered over approximately 95 square mile area, taking in Provo, Salt Lake City, Tooele, and Ogden, this superimposed program naturally found existing roads totally inadequate. An access road program calling for a construction volume seldom equaled in the

By **LESTER A. BLACKNER**

Member Utah State Road Commission,
Salt Lake City

history of the Utah state road commission was necessary.

Fortunately, the state had numerous able and experienced contractors, many of whom had operated widely over the West. Fortunately, also, most of the new roads needed were located in relatively flat country and construction difficulties and costs were minimized. In the two years 1942 and 1943 about 183 miles of access roads or improvements on the strategic network were made. Comprising 59 projects, these roads alone represented \$6,320,000, as compared to

\$9,500,000 for the state's busiest two-year peacetime period.

In addition to construction on the strategic network and access roads, other construction on the Federal Aid and State systems was done, amounting to approximately \$1,415,000, making the total construction for 1942-43 about \$9,000,000.

Most access roads have consisted of oil-mix on rolled gravel base, with local rock asphalt surface added for heavier traffic. Concrete was considered necessary on U. S. 91, the main highway between Salt Lake City and Ogden.

In addition there are some 62 mine-access roads comprising 800 miles and costing \$1,250,000, a few of which have been built under state supervision, but most of which came under the U. S. Grazing Service or Forest Service. These are mainly low-type dozer-built trails, projects varying from 1.5 to 101 miles in length.

Any observer cannot help but foresee that Utah's recent road improvements, although designed and built solely for war purposes, will have a profound effect on the state's post-war development. These roads and the new industrial developments they serve will insure considerable permanent population growth, to say nothing of tourist appeal.

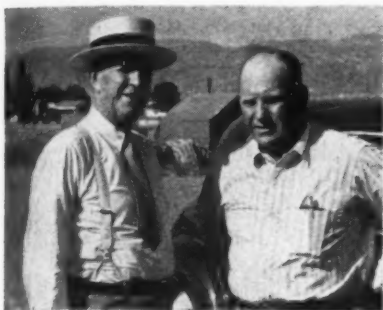
Redwood Road widening consisted 6 in. of gravel base and 6 in. of second-course, the upper 2 in. being oil-mix. One motor grader and one Pulvimixer processed the 26-ft. strip in 2,000-ft. sections



Notes on Typical Utah Projects

Redwood Road. The design and construction methods on this important access road out of Salt Lake City to a small arms plant is typical of Utah practice. The 5.15-mile*project consisted of widening a two-lane oil-mix road by adding two lanes, the new lanes being separated by a 25-ft. neutral zone past the munitions plant.

The existing roadway, as is the practice through this flat area, was built to a raised profile generally one to two feet above the adjacent ground surface; and the first job of A. O. Thorn & Sons Construction Company, the contractors, under direct supervision of E. B. Kennelly, resident engineer, was to build up the grade for



Utah road commission member Lester A. Blackner with Paul Thorn of A. O. Thorn & Sons, who had Redwood Road contract

widening. Elevating graders were used to load the sandy soil from borrow pits and then it was hauled to the project in trucks, with an average haul of about 3 miles. The material was compacted in 8-in. lifts with a sheepfoot roller, and sprinkler. Grading included sufficient width for an 11-ft. shoulder to be graveled later, if further widening is necessary.

The new 40-ft. roadway is made up of three elements: 6 in. of 2 in.-max. crushed gravel base, sprinkled to aid compaction under construction traffic; 6-in. top course of 1-in.-max. gravel placed, sprinkled, and rolled in two lifts, the top 2-in. layer being oil-processed for 26 ft.; and 1-in. of Utah Natural Rock Asphalt added as a surface course.

Material for the oil-mixed layer was dumped in a windrow at the inner side, spread toward the shoulder, processed, then scarified with patrol teeth and rolled. Thorn handled the job in 2000-ft. or shorter work sections, keeping a minimum length of roadway "torn up" to aid the heavy traffic. Motor graders and drag-type pulverizer-mixer equipment was used, and two 10-ton tandem rollers were used in compaction of the bituminous surface. Approximately 4½% of cut-back asphalt, type MC-2, was used for binder applied at 220° F.



Showing 6 plus 3 in. of gravel in place, with drop-off to 11-ft. shoulder graded for future widening. Windrowed gravel for oil-mix is seen at the left, dumped along the edge of the existing roadway to a windrow cross-section carefully controlled by the inspector

The rock asphalt used on the Redwood Road and other projects was quarried at the town of Sunnyside. This material runs about 10% to 11% bitumin and comes in a quite uniform, finely graded sand mixture that has resulted in excellent roads where base strength is adequate.

Following a thorough brooming of the road-mix bituminous surface, a hot tack coat of cut-back asphalt, type RC-3, was applied at the rate of 0.1 gal. per sq. yd. The rock asphalt was then spread with a black-top mechanical spreader and rolled.

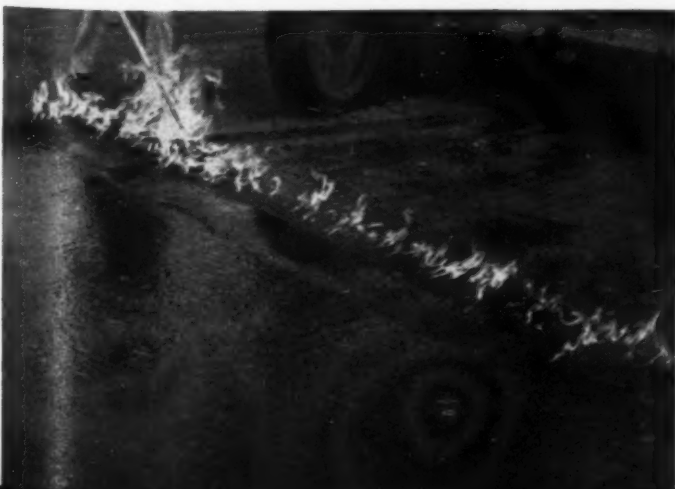
Following the Thorn contract, state forces applied a bituminous penetration treatment for the 6-ft. gravel shoulders, followed with a bituminous seal with cover material.

Roy-Riverdale Road. Although most of the access roads built in the Salt Lake City region involved few difficulties, there were some exceptions. One is the 4-lane Roy-Riverdale project leading diagonally out of Ogden. The road is on an entirely new direct location which involved difficult soil

21ST STREET SOUTH—Spreading hot MC-1 tack coat, a 2-lane plant mixed



(Lower views): The plant mix at the end of each day's run was finished off to a bevel. The following morning, to secure a good bond, the beveled surface was sprinkled with fuel oil, which was allowed to burn for about a minute, then extinguished with fine sand





Roy-Riverdale road, looking down into the valley from an irrigated "fruit bench" area. In distance note standing water from seepage. When it wasn't dusty here plenty of pusher service was necessary to load scrapers



CLEARFIELD-NAVAL SUPPLY DEPOT—This 2½-mile access road near a war plant included rural-type paved sidewalks, for which subgrade sprinkling rolling is shown in progress. W. W. Clyde, contractor. The side culverts are for driveway entrances to suburban and farm homes



conditions. W. W. Clyde, the contractor, had a fine modern grading outfit but plenty tough going because of the tendency of the sandy clay soil to go from one extreme to another. When dry, the dust problem was very bad. When wet, this soil bulked badly and the dozers and scrapers left tracks a

On the Roy-Riverdale job, W. W. Clyde's welder at work strengthening the pinch bar on a scraper. Note new side plates. The policy was to do such jobs in spare moments to prevent failures when tough working conditions are ahead

foot deep before compaction was obtained.

Clyde's grading equipment included three 12-yd. tractor-scraper units, 2 dozers, 2 push tractors, one tow grader and one sheepsfoot roller.

Chief cause of difficulty was seepage of irrigation water from fruit benches through which the new road passed. Grading along saturated side-hill sections required relocation of concrete-lined ditches and extensive sub-drainage. Shoulder drain lines consisted of 8 and 10-in. tile under gravel

back-fill. Laterals were placed as field conditions dictated and "the drainage plans drawn afterward." A pull-shovel did all trenching.

Channelized Intersections

U. S. 91, between Salt Lake and Ogden, carries the heaviest volume of traffic in the state; and with the advent of the war numerous Army and Navy establishments have been concentrated in this area, employing thousands of workers which, of course, has increased the traffic tremendously on the route.

It was found necessary, therefore, to provide channelized intersections at most of the entrances to these establishments.

In general there are the flared type.

with curbed islands which provide extra leeway for all maneuvering at intersections, and also refuge for pedestrians and storage for vehicles.

The islands vary in width from 4 to 20 ft. with triangular islands. At intersection the islands are curbed and surfaced with bituminous material.

House Hearings Open on Federal Highway Aid Bill

The House Roads Committee opened hearings Feb. 29 on the Federal Highway Aid Bill (H. R. 2426), introduced a year ago by Congressman J. W. Robinson of Utah, chairman of the committee. A companion bill was introduced in the Senate by Senator Kenneth McKellar of Kentucky. Hearings before the Senate Committee on Post Offices and Post Roads also are under way.

The bill provides for federal highway aid to state highway departments of \$1,000,000,000 annually each of first three years after the war, funds to be available on basis of 75% federal, 25% state. Cost of surveys, plans and rights-of-way would be included in the costs of projects.

A striking feature of the bill is its provision for the acquisition of rights-of-way, in accordance with Federal laws, where highway departments have been unable to obtain possession. The cost incurred by F.W.A. in acquiring would be considered part of the project, amount to be deductible from the federal share of the cost of the project.

The bill provides that the appropriation shall be apportioned on the basis of one-half population, one-fourth area, one-fourth post road mileage.

The money apportioned each year would be made available as follows: One-half for projects on the system of federal aid highways, and one-half for projects in urban areas and for secondary and feeder roads. Within a state, the division between projects within urban areas and secondary or feeder road projects would be made in the proportion which the population within urban areas and rural areas bears to the total population of the state.

Railroad overpass on the 21st Street South access road, Gibbons & Reed Company, contractors. This job is of interest for the pleasing modern design and outstanding quality of concrete work obtained in spite of labor shortage. At the top of the pour, where abutment concrete was to bond with the concrete deck (see left foreground) watertight forms were built and the freshly placed wall concrete ponded to insure thorough curing in the summer heat



Backbone of arterial traffic in Utah is U. S. 91 between Salt Lake City and Ogden, which has carried up to 10,000 vehicles daily since the war. This road was widened to four lanes and given divider curbs through communities. At this point a concrete lane was added on each side of old black-top or concrete 2-lane pavement and a rock asphalt carpet placed over the old surface. All U. S. 91 junction points with lateral access roads include channelization and left-turn and turn-out lanes of advanced design



HILL FIELD ACCESS ROAD—Traveling plant mix on gravel ballast course, was the answer on this short job, one of several contracts by H. T. Reynolds





Making paint patches (see text on next page)—bitumen applied from a hose is spread with a broom, covered with fine aggregate and rolled. A familiar procedure but one of special importance in 1944—and one that should be done with care and judgment

Patching High-Type Flexible Pavements

Reproduced here with slight condensation is Section I of a sub-committee* report, "Salvaging Old High-Type Flexible Pavements," submitted at the Highway Research Board's recent meeting. How do these recommendations compare with your methods?

HIGH type flexible pavements may be defined as flexible pavements which cannot be readily scarified to mix the surface and base material. They include bituminous concrete, sheet asphalt, penetration macadam and heavier road-mix surfaces.

Thorough patching of such pavements is warranted when a substantial part is in good condition but defects due to surface or base failures have developed.

A. Preparing Old Surface

Where Old Pavement Is Suitable as a Base

Here the patch may have a feather or vertical edge. If a feather-edge patch is made, the old surface is taken as it is and cleaned of all loose or caked dirt and foreign material. The vertical edge patch usually requires cutting out some of the old pavement to develop the required edge. A compressed-air paving breaker is suitable

[Pass this timely article along! It represents a summary of practice which every road (or street) maintenance official, engineer, inspector, superintendent and foreman will find worthy of careful review. Because of the critical importance of pavement salvage and repair work these days ROADS AND STREETS plans to publish additional sections of this report. In April: Section II, "Temporary Maintenance, Repair and Resurfacing of Old Flexible High Type Pavements Awaiting Deferred Construction." Later on: Section IV, "Widening Old Pavements."—Editor].

for cutting vertical edge and removing the old surface.

A thin paint coat of bitumen should be applied, where the patch is to be less than 2 in. thick, to guarantee proper union of old and new material. The bitumen may be sprayed or brushed on. This coat is most necessary on the edges, whether feather or vertical type. Several grades of bitumen will be satisfactory. An RC-2† may be used, although an

†RC-3, RT-5, RS-1 or MC-5 may also be used. If RS-1 surface should be dampened with water (no pools) before applying.

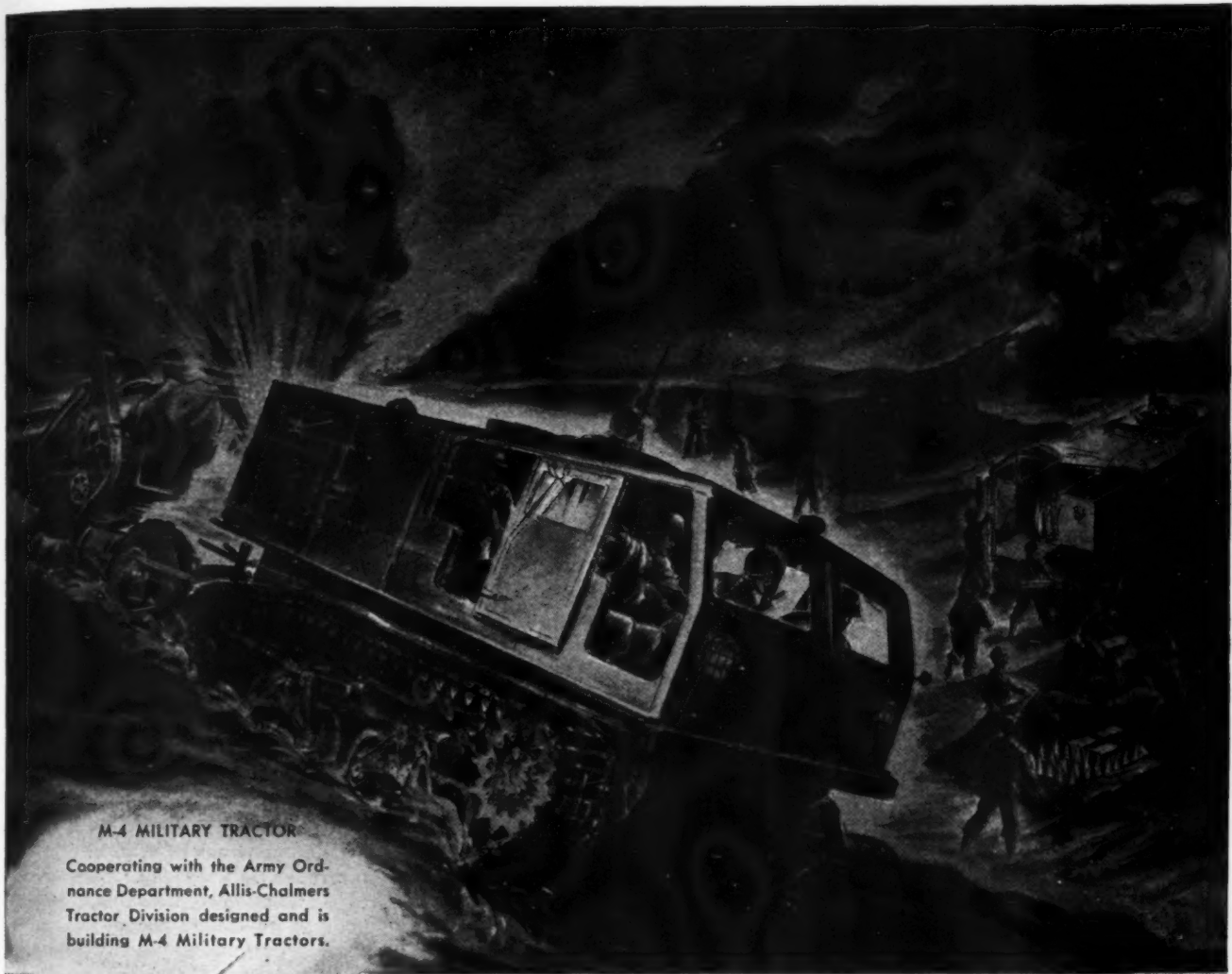
asphalt cement of 85-100 or 100-120 pen. is good when hot and thinly spread. If a light bitumen is used, it should be allowed time to become tacky before patching.

It is desirable that all the surface be uniformly coated, and important that no excess of bitumen be used. What is desired is a uniform, light coating of bitumen to secure adhesion of patch at all points. While the condition of the old surface will determine the amount of paint or tack coat required, usually 0.2 gal. per sq. yd. of actual bitumen will be a maximum. An excess may cause difficulty later through being absorbed by, and causing undue softness in, the mixture.

Surface Heating Old Asphalt

Heating and raking off the old surface preparatory to patching is a very successful method with old sheet asphalt. Where it is cracked, disintegrated or irregular, the old pavement is warmed with a surface heater and is raked off to a depth of $\frac{3}{4}$ to 1 $\frac{1}{4}$ in., care being taken to remove all burned material. Reheat and rake two or more times if necessary to remove high spots. New sheet

*Committee: A. H. Hinkle, Asphalt Institute; H. K. Bishop, Public Roads Admin.; J. S. Crandell, Univ. of Illinois; J. J. Forrer, Virginia Highway Dept.; J. E. Lawrence, Mass. Dept. of P. W.; George E. Martin, Barrett Company, H. D. Metcalf, Ohio Highway Dept.



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ROADS AND STREETS, March, 1944

asphalt is then raked in place and rolled and finished as in building a new sheet asphalt surface. The heated material thus raked off is sometimes used to fill holes in alleys or little-used streets, and either lightly tamped or traffic-compacted.

This heating method may be used also on an old pavement of a fine-graded bituminous concrete type but it is not satisfactory with the coarse graded type.

Digging Out and Replacing Foundation Material

Needed where the base has failed badly in spots and the adjacent pavement is holding well. It is generally advisable to dig out soil to 4 in. or more below the old foundation. Pockets of soft, unstable base soil should be replaced.

Poor drainage, accompanied by wet-weather springs, is often a cause of base failures. If so, in patching it will be desirable to provide drainage with perforated pipe, sewer pipe and/or French drains leading into the side ditches or other drainage outlets, to lower the ground water. On plastic clay soils it is most important to provide drainage from base material through shoulders to side ditches (particularly at bottom of or along grades where water seeps from outcropping of horizontal rock, shale or other impervious strata.)

On clay soil, 1½ to 2½ in. of fine aggregate, preferably crushed stone or slag screenings, should be spread on the foundation soil before the base course aggregate is replaced for the patch foundation. This prevents saturated clay soil from being forced up into the coarse aggregate and weakening the base structure. Next is placed coarse aggregate, well compacted in layers not exceeding 4 in. and filled with screenings. It may be desirable to do base compacting with

an air hammer or vibrator when patches are small and rolling of foundation courses impractical.

Where patching quantity is small, base course may be made of a bituminous mixture which, when properly tamped, is a better guarantee against future settlement than when uncoated aggregate is used. On the base is constructed a new bituminous-mix top which may consist of one of the patching mixtures (See Section D.) Frequently the broken-up old pavement may be satisfactorily used as a part of the base aggregate.

B. Paint Patching

Paint patching (or skin patching) consists of painting the dry surface of a depression or disintegrated area with bituminous material*, promptly spreading and rolling an aggregate covering. Aggregate should be broomed, if necessary, to produce uniform distribution. Although a roller from 5- to 10-ton weight will be desirable, a smaller roller may slightly reduce the cost on small work or isolated locations.

Prompt pressing of aggregate into the bitumen, if a heavy grade of bitumen is used, is most important. Sometimes a small damp spot will hold up the work. Wet areas can be quickly dried by use of a pressure burner or by applying to the damp surface a small amount of gasoline and igniting.

The bituminous material may be hand-brushed on, or sprayed on with a hose and nozzle from a pressure tank (500-gal. or larger distributor tank, 200 to 400 gal. on a 2- or 4-wheel trailer).

Aggregate size for covering will depend on grade and amount of bitumen used (coarser aggregate on heavier bitumen). To cover 0.3 gal.

of MC-5** per sq. yd., No. 6 (¾" to ¾") aggregate generally will be satisfactory. For 0.25 gal. of RC-2***, No. 7 (½" to No. 4); on 0.2 gal. RT-3****, No. 9 (¾" to No. 8). A slightly coarser aggregate can be used with a heavy treatment.

While the quantity of bitumen applied will vary with the roughness of the old surface as well as the grade of bitumen, ordinarily 0.25 gal. per sq. yd. might be taken as the basis for estimate. Aggregate covering generally will average about 10 lb. stone or gravel per sq. yd. per 0.1 gal. of bitumen. However, this will vary with the specific gravities and absorptive properties of aggregates. A little experience will show the proper amount of any grade of bitumen for a particular aggregate. It is important that all the aggregate covering (which should be dry) that will be held by the bitumen, be used. Any appreciable surplus beyond this will be wasted. If the work is properly handled, fat spots will not develop.

Patches to be promptly subjected to heavy traffic should incorporate heavier grades of bitumen which will prevent aggregate from being displaced and the bitumen from being splashed over vehicles.

In building up in thickness to correct a fairly deep depression or correct a weak base, a double treatment may be advisable, using a smaller-sized aggregate on second treatment. If three treatments are used, the aggregate for third application might be ¾" max. or a coarse sand. With these successive treatments, however, the general rule of using all the aggregate the bitumen will hold should not be departed from. The covering

**Other grades may be MC-4, RC-4, RT-8, or a soft AC.

***Other grades may be RC-3, MC-3, RS-1 or RT-6.

****Other grades may be RC-1, MC-1 or MS-2.

*RC-2, RC-3, MC-5, RS-1, RTCB-6, RT-5, or AC 85-100.



(Left) A patched area filled to top with binder. Allowed to compact under traffic before top course is placed. (Right) Checking trueness of patch with straight-edge

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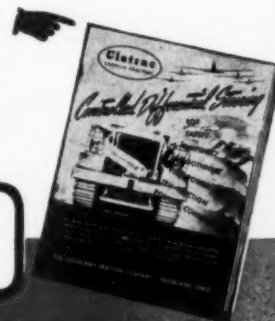
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(Top) Winter precaution: drying a damp hole before filling with patching mix

(Middle) Cold weather patching. Small amount of patch mixture being warmed with an oil burner, after which material is tamped. The material is stirred as it is warmed

(Bottom) Warming old surface to make a feather edge at junction with new pavement

on each application should be compacted by tamping or rolling.

C. Patching With Premixed Material

Patches with premixed material may be made feather-edge or vertical-

edge, the latter being preferable on heavily traveled streets. Premixed material may be one of the classes of "patching mixtures" described under D.

Placing and Compacting

The patching mixture should be spread and tamped or rolled in $\frac{3}{4}$ to 2 in. layers. Thin courses generally secure better compaction and hence stability. If laid in more than one layer, patching mixture just under the top course is frequently referred to as the binder course and can be made of coarser aggregate than the top, which should be a dense mix. However, frequently all courses are made of the top mixtures. The small additional cost of the top-course mixture may be less than the extra expense of providing two different mixtures.

For small areas, where not practical to roll the bottom courses, an air hammer or vibrator may be used in place of hand tamper. A truck wheel passed back and forth over the patch reduces need of hand tamping. Always roll the top course to provide a smooth surface, even though the smallness of the patch does not permit rolling the base.

On secondary road patching it sometimes will be more practical to place the final bituminous top course after the base of untreated aggregate settles under traffic. A temporary surface may be placed on the newly constructed base to protect it during compaction. Temporary surfaces can be made by using base or binder-course bituminous mixtures or a readily workable mix such as Type B mix (using SC-4). After compacting under traffic for some time, the temporary top is dug out and the permanent top constructed. If necessary, the temporary bituminous surface may be heated with an oil burner and raked off. This will leave a good surface to which the new bituminous top course will readily adhere.

When vertical edge patches are fully compacted, the surface of the patch should be just slightly higher than the adjacent old pavement to better guarantee maximum density of the patching mixture. Proper compaction of both base and top courses is a big permanent factor. Compaction is greatly aided if the mixture is in the stage of cooling or curing which produces a slightly sticky mixture that will "stay put" when tamped or rolled into place.

A mixture of proper consistency, of cold or semi-cold type, can be secured by using the right grade of bitumen to fit the weather conditions or by properly aerating or aging the mixture to a suitably cured stage. An

MC-5 or RTCB-6 mix will be suitable for use in hot weather immediately after mixing, while an MC-3 or RTCB-5 mix will be best if allowed to cure some time before using. On the other hand, an MC-3 or RTCB-5 mix could be used promptly after mixing in cold weather.

D. Patching Mixtures

These are many. They may be classified as hot mix and cold mix. A cold mix type is one that is workable when cold and does not necessarily have to be mixed cold. Many of the cold mix types are made from hot bitumen and aggregate which has been heated to dry it. With the hot mix type the mix is laid and rolled while hot. Semi-cold is the term sometimes applied to a mix that is only heated moderately and that must be used before it reaches atmospheric temperature except in the hottest weather.

Dry Aggregate Desired

In most patching mixtures, best results will be secured with dry aggregates. Although with emulsions, surface dampness of aggregate before adding the emulsions is desirable (and with some emulsions necessary), a large amount of internal moisture in the aggregate may be detrimental. While during the dry summer months, a sun-dried aggregate often will be satisfactory, it is necessary, where continuous patching is done, to have available a means of artificially drying the aggregate. Small portable driers are now available for this purpose. Recent research work, however, in pretreating either the asphalt or aggregate with certain materials to secure good adhesion of asphalt to wet aggregate, gives promise of results.

The maximum size of aggregate in a patching mixture should not be greater than two-thirds the patch thickness. However, this rule is not always practical with feather-edge patches because of varying depth of the depression. A heavy roller crushes the coarser particles at the feather edge, thus reducing the oversize pieces. For average conditions, $\frac{5}{8}$ -in. max. aggregate is satisfactory. However, if many of the patches are shallow and the securing of a smooth surface is a factor, $\frac{1}{2}$ or even $\frac{3}{8}$ -in. max. will be better.

A coarser aggregate for the bottom courses of deep patches is desirable but several layers of the top course mix will be entirely satisfactory. One advantage of the coarser aggregate in the bottom courses is that it should cost less. However, with small quantities, it may cost less to use one

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Table Showing the Principle Uses of

CLASS OF WORK		GRADE OF																	
		SC—Slow Curing Road Oils					MC—Medium Curing Cutback Asphalts					RC—Rapid Curing Cutback Asphalts							
		0	1	2	3	4	5	0	1	2	3	4	5	0	1	2	3	4	5
1.	Dust Palliative (on dirt or dirty aggr.).....	X	X	X	..	..	..	X	X	..	..	..	..	..	..	..	..	..	..
2.	Soil (base) Stabilization .....	..	..	..	..	..	..	..	..	X	..	..	..	..	..	..	..	..	..
3.	Blotter or Mulch Treatment, excess of fines.....	..	..	X	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
4.	Priming	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	a. Tightly bonded surface .....	..	..	..	..	..	..	X	X	..	..	..	..	..	..	..	..	..	..
	b. Loosely bonded fine aggregate surface.....	..	..	..	..	..	..	..	X	X	..	..	..	..	..	..	..	..	..
	c. Loosely bonded coarse aggregate surface.....	..	..	..	..	..	..	..	..	X	..	..	..	..	..	..	..	..	..
5.	Tack Coat	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	a. Bituminous Surface .....	..	..	..	..	..	..	..	..	X	..	..	..	..	..	X	X	..	..
	b. Brick and Concrete .....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
6.	Surface Treatment (seal or skin)	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	a. With or without light sand covering .....	..	..	..	..	..	..	..	..	..	..	..	..	..	X	..	..	..	..
	b. Coarse Sand covering .....	..	..	..	..	..	..	..	..	X	..	..	..	..	..	X	X	..	..
	c. Clean 1/2" aggr. covering.....	..	..	..	..	..	..	..	..	..	X	..	..	..	..	X	X	..	..
	d. Clean 3/4" aggr. covering.....	..	..	..	..	..	..	..	..	..	..	X	..	..	..	..	X	X	..
	e. Clean 1" aggr. covering.....	..	..	..	..	..	..	..	..	..	..	..	X	..	..	..	..	X	..
	f. Clean 1 1/2" aggr. covering.....	..	..	..	..	..	..	..	..	..	..	..	..	X	..	..	..	..	X
	g. Graded gravel aggr. covering.....	..	..	..	..	..	..	..	..	X	X	..	..	..	..	..	..	..	..
	h. Gravel mulch .....	..	..	X	..	..	..	..	..	X	..	..	..	..	..	..	..	..	..
7.	Dragged Leveling Course	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	a. Open graded aggregate .....	..	..	..	..	..	..	..	..	..	X	X	X	..	..	..	..	X	..
	b. Dense graded aggregate .....	..	..	..	..	..	..	..	..	..	X	X	..	..	..	..	..	..	..
8.	Road Mix	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	a. Open graded aggregate	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	1. Sand .....	..	..	..	..	..	..	..	..	..	..	X	..	..	..	X	X	..	..
	2. Max. diameter 1", high % pass. 10 mesh.....	..	..	..	..	..	..	..	..	..	..	X	..	..	..	..	..	..	..
	3. Macadam aggregate .....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	X	X	..	..
	b. Dense graded aggregate	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	1. High % pass. 200 mesh.....	..	..	X	X	..	..	..	..	X	..	..	..	..	..	..	..	..	..
	2. Max. diameter 1", mod. pass. 200 mesh.....	..	..	X	X	..	..	..	..	X	X	..	..	..	..	..	..	..	..
9.	Bituminous (hot pent.) Macadam	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	a. Warm climates .....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	b. Northern climates, summer .....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	c. Northern climates, cool weather .....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
10.	Cold Penetration Macadam .....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	X
11.	Seal Coat, New Construction.....	..	..	..	..	..	..	..	..	..	..	X	X	..	..	..	X	X	X
12.	Cold Patch	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	a. Open graded aggregate .....	..	..	..	..	..	..	..	..	..	X	X	..	..	..	X	..	..	..
	b. Dense graded aggregate .....	..	..	..	..	X	X	..	..	..	X	X	..	..	..	..	..	..	..
13.	Plant Mix, Cold Lay	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	a. Open graded aggregate	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	1. Sand .....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	X	X	..	..
	2. Max. diameter 1", high % pass. 10 mesh.....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	X	X
	3. Macadam aggr. ....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	X	X
	4. Macadam aggr., Liquefier Type .....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	b. Dense graded aggregate	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	1. High % pass. 200 mesh.....	..	..	..	..	X	X	..	..	..	X	X	..	..	..	..	..	..	..
	2. Max. diameter 1", med. % passing 200 mesh..	..	..	..	..	..	..	..	..	..	..	X	X	..	..	..	..	..	..
	c. Primer to be followed with soft AC.....	..	..	..	..	..	..	..	..	X	..	..	..	..	..	..	..	..	..
14.	Plant Mix, Hot Laid	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	a. Sheet asphalt .....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	b. Bituminous concrete .....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	c. Medium hot, Class F.....	..	..	..	..	..	..	..	..	..	..	X	..	..	..	..	..	..	X
	d. Medium hot, oil-aggregate .....	..	..	..	..	X	X	..	..	..	..	..	..	..	..	..	..	..	..
15.	Crack Filler .....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	X	X

(1) Emulsified asphalt to be diluted, 3 parts emulsion to 9 parts water. (2) To be mixed with sand but produce a flowable mix.

For any particular project, usually one of two or more different grades of bituminous materials may be used with satisfactory results. However, this is not always true as the grade of aggregate may dictate the particular grade of bituminous material that will

give best results. Generally the heaviest grade of liquid asphalt that can be readily incorporated with the aggregate being used and which produces a mix which can be readily and uniformly spread will result in the most service for money expended.

grading for all courses. With cold-mix types, each layer should be permitted to cure before the next is added.

A patching mixture with aggregate size comparable to that used in the roadway usually will come nearest matching the old pavement in appearance as the patch ages. On residential streets or important highways, this factor may be entitled to some consideration.

Proper grading of aggregate and amount of bitumen is just as important in a patching mixture to secure good stability as for a new pavement. Frequently patches shove, roll, or ravel because of carelessness in proportioning and grading. A good mix usually will stay where placed but if carelessly placed may be rough. However, if the ingredients

have not been properly proportioned, it may be short lived. The laboratory, or one experienced in this work, should be consulted on proportioning. Avoid too much bitumen. In the following eight paragraphs, various patching mixtures are described:

(1) **Class B Mix, Using SC-4, MS-2 or MC-2.** Quite workable on secondary roads and may be most economical for temporary patching on heavily traveled surfaces. Workability makes them suitable for certain winter patching. The SC-4 and MC-2 mix may be stored for many months. Aggregate for an SC-4 and MC-2 mix should be dense-graded and dried to not over 1% moisture. Since the MS-2 is an emulsified asphalt, aggregate mixed with it need not be heated, and must be of open-grade, practically all retained on

1/2 in. Although aggregate for an MS-2 mix frequently need not be dried, it should not contain excess moisture. Dampen the surface of the aggregate, if too dry, before the MS-2 is added.

(2) **Class F Mix, Using MC-5 Cutback Asphalt or Tar RTCB-6.** This mix may be made the same as Class I except the bitumen is not heated to so high a temperature (175°-225° F. for MC-5 and 100°-135° F. for RTCB-6). It is preferable that aggregate not be over 225° F when mixed with the MC-5 and 135° F for tar, although it should be heated sufficiently high to dry to less than 2% moisture. Such a mix must have fewer fines than the Class I, not over 2% through the 200-mesh. This mix stiffens quite rapidly but will store several weeks during the hot summer weather.

must be used, practically all retained on $\frac{1}{8}$ -in.

(4) Class H Cold Mix (Liquefier Type). Made of an open graded aggregate and 85-100 pen. asphalt cement with just sufficient liquefier (0.2 to 1.5% naphtha) to preserve its workability according to air temperature and time of curing when being used. Aggregate should be dried and cooled to about 100° F. before liquefier is added, after which the hot AC is introduced.

It should be placed in comparatively thin courses (preferably not over $1\frac{1}{2}$ in.) to permit liquefier to pass out. In cold weather the mix may be hauled in insulated trucks and used warm before it hardens. Ordinarily each layer must be allowed to cure before placing the next layer. The least amount of distillate that will allow proper spreading is desirable.

(5) Class H Cold Mix (Tar Binder), made of tar RT-8 or RT-9 and an open graded aggregate. Aggregate should not be above 135° F. while mixing.

(6) Class I Hot Mix (Asphalt Binder). A plant mix made of heated aggregate and hot AC, 85-100 pen. or slightly softer asphalt. Must be laid and spread at 225° to 300° F. and rolled while hot as it becomes unworkable on cooling. A fairly dense-graded aggregate with 2% to 8% through the 200 mesh, is desirable. Although for this mixture, any standard hot-mix bituminous concrete may be used, it is not best to use the lower penetration asphalts. Because of greater workability of softer asphalts, frequently these will be desired even up to 150 pen. With the softer asphalt cements, feather edge patches can be satisfactorily made with the fine-graded aggregate type.

(7) Class I Hot Mix (Tar Binder). Made of Tar RT-11 or RT-12. Aggregate should be from 150° to 225° F. at time of mixing.

(8) Class J Mix (Sheet Asphalt). While any of various plant mixes may be used here for patching, a mix that will produce a surface comparable in appearance and durability to that of the existing surface is preferable. Hence Class J (sheet asphalt) generally should be used in patching old sheet-asphalt pavements, whenever practical to secure sheet-asphalt mix.

A dense graded bituminous concrete Class I, Hot Mix, is the best substitute for sheet asphalt mix where the latter cannot be readily secured. In warm weather thin courses of sheet mix, made with 85-100 pen. AC, serves well in feather-edge patches. In making sheet-asphalt mix for patching

where only small quantities are taken from the plant, care must be taken not to overheat, or mix unduly long, as both will harden the asphalt.

E. Methods of Making Patching Mixtures

For thoroughness and uniformity it is preferable that patching mixtures be made in a pugmill or similar-type mixer. When it is not practical to use such a mixer, it is best to make one of the more workable mixes, using an open-graded aggregate, such as Class B, F or H, mixable in a concrete mixer.

Where a plant mix cannot be secured, a very practical way of making a mix of the Class B or F type is to spread the aggregate on an abandoned piece of pavement, apply the bituminous material from a distributor and do the mixing with a motor grader as in making an ordinary road mix. After mixing, the material is ridged and loaded by hand or power shovel and hauled to the stock pile or direct to the road for immediate use.

F. Patching With Road Mix

On secondary roads, extensive patches, say 50 or more ft. in length, may be made over the whole or half width of the surface by making a road mix. Such a patch may be desirable to cover a large area that is failing as the result of a weak base or disintegrating top, or both.

The old surface is first sprayed with .15 to 0.25 gal. of RC-3*. On this tack coat the proper sized aggregate** is spread one to 3 in. in depth, and sprayed with asphalt RC-3*. The aggregate and bitumen are mixed as in building an ordinary road-mix surface. Generally don't use too slow-setting bituminous material, for this work is usually done without closing road to traffic.

Because it is not always practical to use a dense graded aggregate in this work, a choke and seal coat may be necessary. Frequently such patching precedes a general surface treatment. If the patches have a much more open texture than the adjacent old surface, they should be pre-sealed or choked before over-all surface treatment.

G. Cold Weather Patching

(Air temp. 20° F to 45° F). While cold weather patching is usually to be avoided, it does sometimes become

*Other grades of bitumen that may be used are RC-2, MC-3, RT-6, RT-7 or MS-1.

**The maximum size of aggregate of $1\frac{1}{4}$ ", or not to exceed two-thirds the depth of the finished course (whichever is smaller) to be constructed, is desirable.

necessary when small potholes have developed.

Patches can be successfully made during cold weather by drying the surface of the depression or hole with a blow torch, oil burner, or other source of heat. After raking off any burned material, the patching mixture is promptly spread and tamped or rolled. Hot mix, or a cold mix type that has been warmed should be used for this winter patching. Heated material may be in insulated truck beds in cold weather as far as 25 miles if well covered. If the mix becomes chilled, a burner may be directed lightly against a portion of it, care being taken not to burn it.

Special care should be taken to guard RC type mix against fire in heating with an open flame if the mix is freshly made. Although a patch made in this manner may be as satisfactory as one made in summer weather, it will cost considerably more.

N. Dakota Has Plans Drawn for 400 Miles

Plans have been finished for about 400 miles of state post-war grading and surfacing work and incidental bridges and grade separations, and a large part of the right of way acquisition also completed, said J. S. Lamb, state highway commissioner, at the recent annual meeting of the N. Dakota Highway Contractors Assn. This work will require \$8,000,000. Survey work is done for an additional 140 miles. J. A. Jardine, of Jardine Bridge Co., Inc., Fargo, N. D., was re-elected president of the association.

Gas Tax Collections in 1943

Approximate motor fuel tax collections in 27 states from January through December, 1943, were 32.3 per cent less than for the year 1941, according to figures issued last January by the Public Roads Administration. In 1941 the net receipts for the 27 states were \$634,413,000; for 1943, \$429,450,000.

Traffic Over Pennsylvania Turnpike

Traffic over the Pennsylvania Turnpike in December, 1943, showed a decrease of 49½ per cent over the corresponding month in 1941. The traffic in the last month of 1943 was 53,507 passenger cars and 23,828 trucks, which was an increase of 51.9 per cent for passenger cars over December, 1942, and a decrease of .4 per cent for trucks and busses. For the corresponding month in 1941 the decrease was 57.7% for passenger cars and 9.8% for trucks and busses.



Arrange Your CONCRETE PATCHING SCHEDULE for 24 Hour Repair Service

Pavement patching must not be permitted to delay vital wartime traffic with sign cluttered pavements and extensive detours. Old-fashioned patching methods and delayed repairing are inadequate to meet the wartime need for uninterrupted flow of materiel.

Twenty-four hours is plenty of time for concrete to acquire safe opening strength. This is true even at low temperatures when proper cold weather concreting practices are followed. Just take advantage of the property of calcium chloride to produce required opening strength in about half the usual time.

The gains in strength resulting from the use of calcium chloride are uniform in mixes with either standard portland, high-early-strength or air entraining cement. No matter which cement you use calcium chloride will cut in half the time required to provide good patches. And, with calcium chloride in the mix you also get "built-in curing" to produce higher strength at all ages.

Our technical bulletins and our booklet, "Early Strength Concrete" are available on request.

CALCIUM CHLORIDE ASSOCIATION
4145 Penobscot Building Detroit 26, Mich.

DON'T

SLOW

WAR

TRAFFIC

SPEED

PAVEMENT

PATCHING

WORK

Collective Bargaining for Professional Engineers

THROUGH bitter experience it has been shown that bargaining between employers and employees is a group activity from which individuals are powerless to dissociate themselves, and that unless professional groups undertake the establishment of bargaining units of their own choosing, such functions will be assumed by units composed chiefly of sub-professionals and non-professionals. With these conditions in mind, the American Society of Civil Engineers is advising professional civil engineering employees throughout the country to form collective bargaining groups of their own, separate and distinct from non-professional and sub-professional groups and unaffiliated with trades and labor groups. In addition, the Society has outlined procedure to be followed and is prepared to offer advice and assistance to its members involved in collective bargaining instances.

With the enactment of the National Labor Relations Act (Wagner Act) in 1935, nearly all employees were granted the right to bargain collectively. This and following legislation set up machinery to assist the formation of bargaining agencies. During ensuing years a few well organized trade unions have undertaken the bargaining function for wage and salary earners until today it is estimated that nearly 20,000,000 are enrolled in such groups. Although in many respects these unions have done and are doing an excellent job for their members through their structure, objectives, and methods, they are inadequate to represent professional employees.

Collective Bargaining Groups Recommended

Recognizing this inadequacy, the American Society of Civil Engineers has recommended to its Local Sections that, within their respective areas, they institute collective bargaining facilities for civil engineers to which, under certain circumstances, may be added other professional engineering employees. Thus, through self-financed and self-administered groups of their own choosing, one classification of professionally-minded employees will be enabled to maintain its identity.

This action, which has a two-fold purpose, was taken after long deliberation and careful study of events. One purpose is to give assistance to

employee engineers who need help in matters relating to employment conditions. The other is to supply the machinery within the profession whereby professional engineering employees may bargain collectively in units of their own choosing under leaders of their own choosing.

A typical case, illustrative of the problem, is that of the Sunflower Ordnance Plant in Kansas. At this huge war plant, a local of the International Federation of Technical Engineers, Architects and Draftsmen's Union, A. F. of L., through customary procedure prescribed by the Wagner Act, assumed bargaining rights for both sub-professionals and professionals in certain classifications including civil engineers. Professional engineering employees, thus included, belatedly challenged this position at a hearing before a panel of the Regional War Labor Board. Despite all evidence presented, the legality of the action taken by the union was upheld on the grounds that the professional group for more than a year had neglected to act in its own interests and that, in addition, the professional group had difficulty in defining itself.

On the other hand, in a long series of cases it has been established that when a unit of professional employees exists it is desirable that that unit be recognized as separate from a union of sub-professionals or non-professionals. Such a case was that of the Shell Development Company of California and the Federal of Architects, Engineers, Chemists and Technicians, C. I. O. There the National Labor Relations Board directed that separate elections be held "in order that we may ascertain the wishes of the professional employee."

Engineers Included in Union Agreement

In numerous cases professional engineering employees who have not experienced this desire for separate group action have been included in the agreements which trade unions have signed with employers. Typical are those in the engineering offices of the shipbuilding industries. Here such inclusion has made it necessary for an engineer seeking employment to apply at the office of the business agent of the trade union and thereafter be governed by such bargaining activities as the union may deem necessary. Professional employees in

many growing engineering organizations, have found themselves face to face with the following choices; they can remain unaffiliated with a group which, dominated by sub-professionals, bargains for members and non-members alike; or they can join with such a group; or they can form an independent bargaining group composed of professional men of their own type and choose their own course of action.

Recommendations of Board of Direction

It is out of consciousness of such situations that the formation of professional groups has been recommended by the Board of Direction of the American Society of Civil Engineers. Its action, taken on Oct. 11, 1943, followed studies begun in 1937. Specifically the Board recommended:

1. That each Local Section of the Society establish a Committee on Employment Conditions to consist entirely of professional engineering employees.
2. That for a period the members of the Committee be employee members of the Local Section elected by letter-ballot; voting to be restricted to employee members of the Local Section and such other professional engineering employees as have paid stipulated dues.
3. That the Committee hold such business meetings as are necessary and file annually a public report of its receipts, expenditures and activities.
4. That the committee have the duty and the power to direct all activities necessary to establish satisfactory working conditions and compensation within the geographical limits of the Local Section.

5. That any member of the Committee directly interested in the outcome of a specific case withdraw from participation in that bargaining procedure.

6. That all expenses of the Committee be defrayed by dues collected from those engineering employees requesting to belong to the bargaining group.

The recommendation also proposes the employment of four field representatives at the expense of the Society to assist and advise the Local Section committees as necessary, one of whose principal functions is to

(Continued on page 86)

That more planes may fly

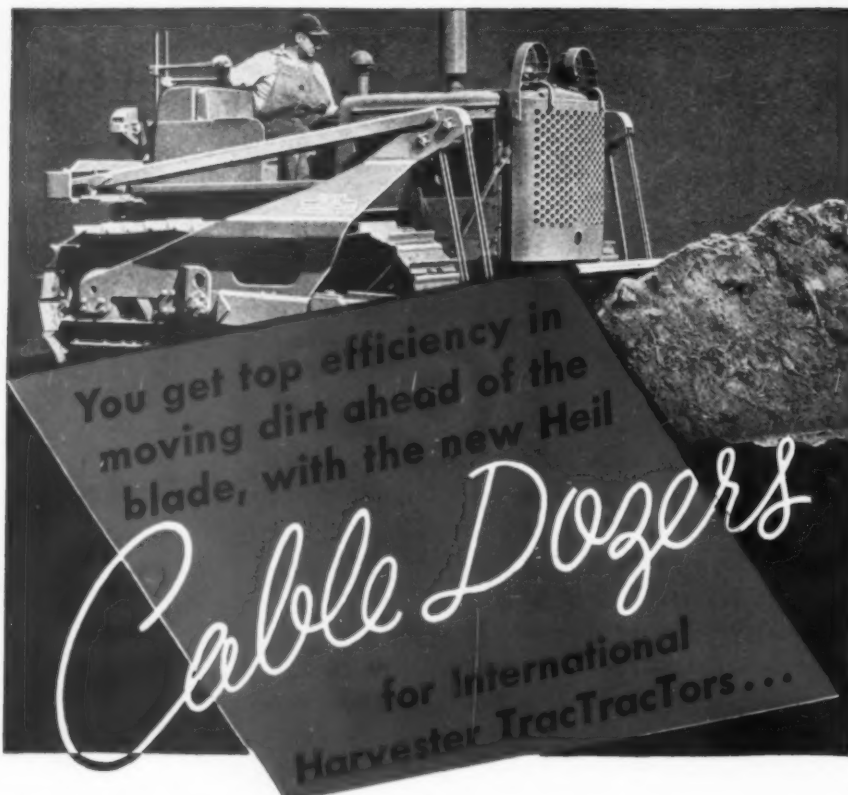
Today, endless caravans of giant trucks are rolling night and day all over the face of America . . . all dedicated to but one proposition: That more planes may fly . . . that more ships may come down the ways . . . that a nation may have everything it needs to fight—and win!

To perform this essential job . . . to make sure that it will be done in the minimum time and with the minimum cost in equipment, manpower and precious fuel stores . . . the country's biggest operators are using the power that, for more than a decade, has been setting the pace in economy, speed and dependability—*Cummins Diesel Power*.

So marked has been this trend to Cummins in the motor transport field that 90% of all long-line, heavy-duty, diesel-driven trucks are now Cummins-powered. Here is ample proof that major fleet owners have learned that the surest way to "get there fustest with the mostest" is to power with Cummins Dependable Diesels. CUMMINS ENGINE COMPANY, Columbus, Indiana.

This is the fifth in a series of advertisements depicting the war-time role of Cummins Diesel Power in the nation's basic industries. If you are operating Cummins Diesels on your job, make doubly sure of their most efficient use by providing for their proper maintenance and service. Ask your Cummins Dealer for details.





You get top efficiency in moving dirt ahead of the blade, with the new Heil

Cable Dozers

for International Harvester TracTractors...

This new equipment is designed to give perfect balance with International TracTractors, so that the full power of your tractor drives on the blade—moving more "pay dirt" with each load.

In every way, tractor and equip-

ment work together in a perfectly matched team. The simplified mounting does not obstruct the operator's view, but gives him full, free vision ahead. Note the convenience of the controls which are adjustable to his reach.

The machine "feels right"—performs smoothly, gives fast, positive action under the toughest conditions. Send for bulletin describing many other features which assure you of outstanding performance at lower cost.

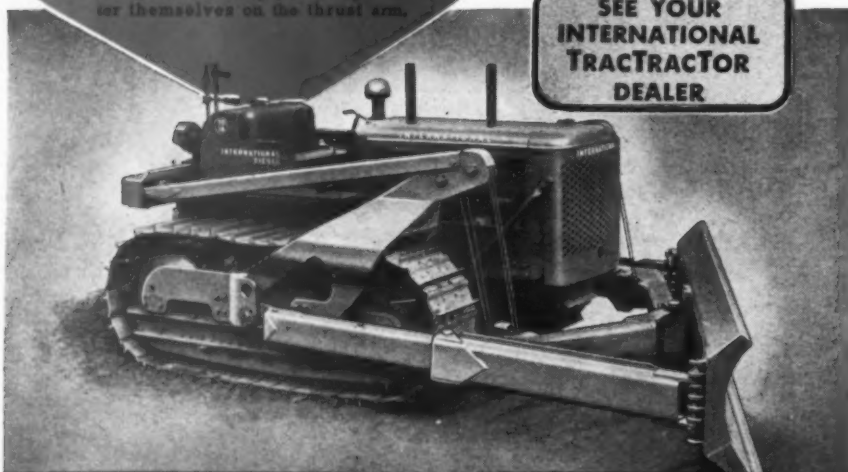
R-23

Angling the blade is quick and easy...

One man can do it in less than 5 minutes

The angling adjustment is equipped with slides that are especially easy to adjust, since they practically center themselves on the thrust arm.

SEE YOUR
INTERNATIONAL
TRACTRACTOR
DEALER



THE HEIL CO.

GENERAL OFFICES

MILWAUKEE 1, WISCONSIN

A.G.C. Meeting Report

(Continued from page 55)

construction projects are sure to be available, according to Ernest M. Fisher of American Bankers Association. The peace-time financial success of the Pennsylvania turnpike and certain large toll bridges justifies careful governmental study toward similar projects, he said, which might be readily financed out of huge fund accumulations of life insurance, building-loan companies, banks, etc.

Orderly resumption of some civilian construction soon, in spite of recent public statements to the contrary by WPB officials, was held out as a possibility by Mr. Foreman, who said that WPB is studying the problem seriously. How to revise L-41 order and other questions are being studied by the Construction Industry Committee set up in 1943 under the U. S. Chamber of Commerce (A.G.C., construction industry and labor represented). He cited recent L-41 clarifications, and reminded that while steel and copper have become easier, lumber and manpower are bottlenecks.

War Jobs for Contractors

Outlets for the contractor's services were discussed by Fred I. Rowe, chairman A.G.C. Market Development Committee, who expressed concern over the lack of future thinking now being shown by currently prosperous contractors. Lean times are ahead, he said. Contractors should investigate the possibility of taking logging and lumber production contracts, where help is badly needed. Every contractor should help sell and promote needed future construction projects in his vicinity.

The state post-war highway program calling for a billion dollars a year in new arterial road work was described by A.A.S.H.O.'s executive secretary, Hal H. Hale. He underscored the importance of the help that contractors can render by laying all possible facts before Congress at the current hearings. The A.G.C. adopted a resolution urging Congress and the President to push legislation to finance such a program.

1944 A.G.C. Officers

William Muirhead, pres., William Muirhead Construction Co., Durham, N. C., was elected A.G.C. president, succeeding Oscar B. Coblenz, McLean Contracting Co., Baltimore, Md.

H. A. Dick, pres., Gilpin Construction Co., Portland, Ore., was elected vice-president. E. M. Rust, Washington, D. C., vice-president, Rust Engineering Co., was re-elected secretary-treasurer.

The following were elected directors: Dan J. Cavenagh, Twin Falls, Ida.; Ford J. Twaits, pres., Ford J. Twaits Co., Los Angeles, Calif.; C. B. Berry, pres., Hamilton & Gleason Co., Denver, Colo.; J. Rutledge Hill, vice-pres., Gifford-Hill & Co., Inc., Dallas, Tex.; Geo. H. Murch, vice-pres., Murch-Jarvis Co., Inc., St. Louis, Mo.; A. A. McCree, pres., McCree & Co., St. Paul, Minn.; Robert E. O'Connor, pres., J. C. O'Connor & Sons, Inc., Ft. Wayne, Ind.; Thos. B. Carmichael, pres., The C. W. & P. Constr. Co., Akron, Ohio; George M. Eady, pres., Geo. M. Eady Co., Louisville, Ky.; Ivy H. Smith, pres., Ivy H. Smith Co., Jacksonville, Fla.; Henry E. Baton, pres., Henry E. Baton, Inc., Philadelphia, Pa.; Roy B. Rendle, pres., Roy B. Rendle & Co., Inc., East Boston, Mass.; S. L. Fuller of John F. Casey Co., Pittsburgh, Pa.

The following were elected division chairmen and vice-chairmen:

Building Contractors Division—Ford J. Twaits, Ford J. Twaits Co., Los Angeles, Calif. (chairman); W. K. Shaw, Turner Construction Co., New York City (vice-chair.).

Highway Contractors Division—D. W. Winkelman, D. W. Winkelman Co., Syracuse, N. Y. (chair.); Morris E. DeWitt, Porter-DeWitt Const. Co., Poplar Bluff, Mo. (vice-chairman).

Heavy Construction and Railroad Contractors Division—G. W. Maxon, Maxon Construction Co., Dayton, O. (chair.); Lyman D. Wilbur, Morrison-Knudsen Co., Los Angeles, Calif. (vice-chair.).

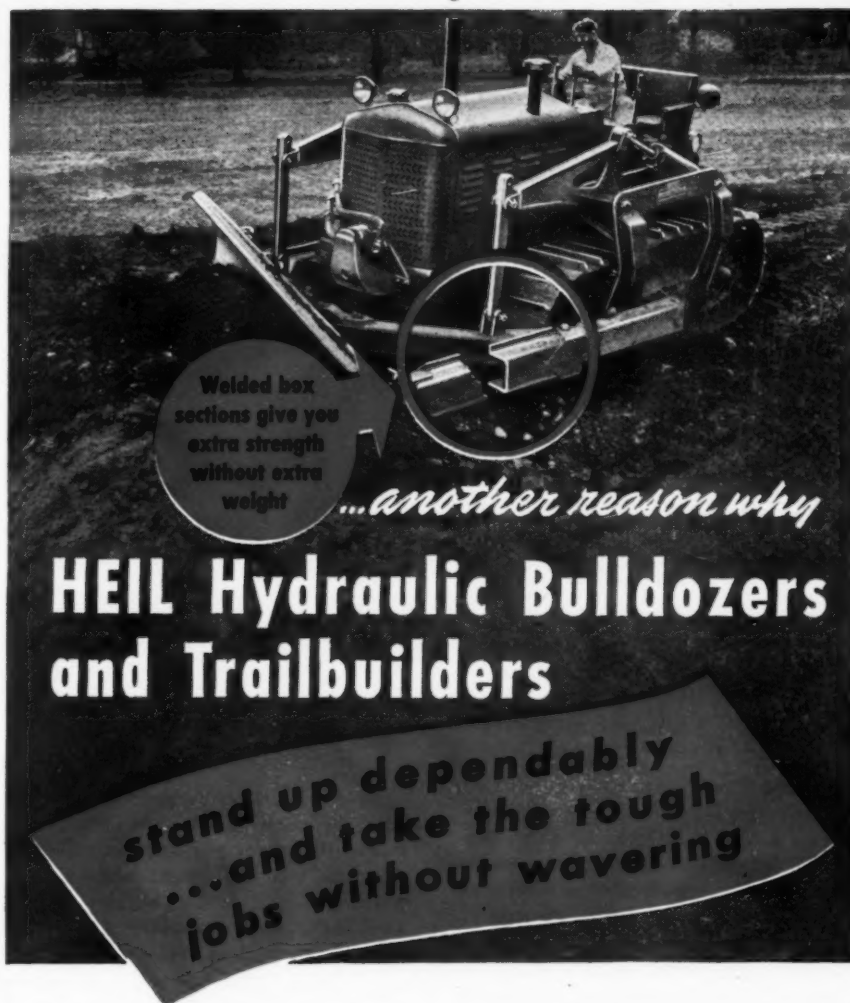
Awards to Contractors

The following A.G.C. awards were presented to "heavy" and "highway" division winners in accident prevention contests:

The Swenson trophy for heavy construction division was awarded to Wm. H. Ellis & Son Co., East Boston, Mass. Honorable mentions to Newbery Electric Corp., Los Angeles; Albert Brothers Contractors, Inc., Salem, Va.

The Zachry trophy for the highway construction division was awarded to the Potomac Construction Co., Martinsburg, W. Va. Honorable mention to Colglazier & Hoff, Inc., San Antonio, Tex., and Edwardsville Construction Co., Edwardsville, Ill.

The Cross cup (New England contest) was awarded to Wm. H. Ellis & Son Co., East Boston. Honorable mention was given to E. J. Cross Co., Worcester, and Vappi & Co., Inc., Cambridge.



Welded box sections give you extra strength without extra weight

...another reason why

HEIL Hydraulic Bulldozers and Trailbuilders

stand up dependably
...and take the tough jobs without wavering

Heil engineers and fabricators have pioneered the modern practice of replacing heavy members with welded box sections that are lighter, stronger, and easy to repair in the field without costly delays. The advanced design of Heil equipment assures you of more speed . . . greater flexibility . . . and ability to push through when the going is tough. Because they're tailor-made to Cletrac Tractors, you get full visibility for safe, efficient handling.

The Trailbuilder blade is easily angled to right or left for side-casting new cuts. Bulldozer blade takes rocks and stumps without changing pace.

The Heil hydraulic system comes close to a perfect leak-proof unit—stays in adjustment and gives a minimum of trouble.

For full loads and more yardage per day and per year — at lower cost — use Heil Earth-moving equipment.

Write for bulletins.

R-24

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CLETRAC
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THE HEIL CO.

GENERAL OFFICES • MILWAUKEE 1, WISCONSIN

North Atlantic Highway Officials Discuss Post-War Financing

WHEN the Association of Highway Officials of the North Atlantic States meet, its program can usually be counted on to rival the national conventions in significance. The 20th annual meeting, Feb. 17-18 in New York, was no exception. Under program committeemen Reindollar (Md.), Sargent (Vt.) and Mack (Del.) major current and future problems were dealt with candidly and without pulling punches.

William J. Cox of Connecticut was elected president of the North Atlantic states group for 1944, succeeding Herman A. MacDonald of Massachusetts; R. B. Traver, County Supt. of Highways, Onondaga County, Syracuse, N. Y., was elected vice-president; A. Lee Grover of New Jersey was re-elected secretary-treasurer.

Among the speakers were Joe R. Hanley, lieutenant governor of New York; J. A. P. Marshall, chief municipal examiner of Ontario, representing the province's minister of highway and public works, George H. Doucett, and (speaking for a large Canadian delegation) Theodore G. Morgan, Canadian Good Roads Association.

Where future road money will come from and how the pie will be cut up were the principal subjects. In his address of welcome to New York, Mayor La Guardia went to the bat for metropolitan interests by saying, in part, "To understand each other let us admit that we all need federal assistance . . . some of our cities in the past haven't gotten a great deal out of federal aid, and all that must be changed." He bluntly stated that cities must have a larger share of future federal aid funds; 25% for cities might be acceptable to the mayors group, but funds distribution should be confined to cities of perhaps 50,000 up.

New York City Planning Off-Street Parking

Proper off-street parking facilities are an important factor in any urban highway program, he reminded. The Robinson bill now pending recognizes this need for the first time in any proposed national legislation. Stressing that urban highways are needed on their own merit and not just as job-giving projects, he explained that New York City's post-war program is already well advanced.



New Pres. of N. Atlantic highway group, William J. Cox, Conn.

Mayor La Guardia considers essential for New York and other big cities: Off-street parking facilities for all new loft buildings; underground parking facilities for all new multi-dwellings; more two-story and multi-story parking lots; relocation of bus and truck terminals to channelize heavy commercial vehicles.

In the latter connection, the New York Port Authority is planning a bus terminal in lower Manhattan. "We can't have buses and trucks roaming all over our streets," he said. "We must keep these vehicles out of mid-town congestion."

Forseeing a 50% increase in traffic over the pre-war peak and serious new congestion within 12 to 18 months after the war, the mayor said, "There isn't a city in the U. S. able to absorb more traffic than it had in 1941 unless there are more traffic facilities."

Mayor La Guardia decried also the fact that the New York Supreme Court can nullify the efforts of the best traffic experts in street regulation matters.

Pres. MacDonald's F. A. Ratio, One of Several

In his annual message, association president Herman A. MacDonald (Mass.) gave a statistical picture of the bigness of the road job to come. In spite of expenditure of 40 billion dollars on the nation's roads in the past thirty years, serious problems remain unsolved as best expressed by the toll of 35,000 traffic deaths and 1,200,000 injuries annually. He threw

out one of several formulas for post-war federal-aid allocation between the states, his recommendation being to change the present $\frac{1}{3}$ - $\frac{1}{3}$ - $\frac{1}{3}$ ratio (population, post-road mileage, area, respectively) to $\frac{1}{2}$ - $\frac{1}{4}$ - $\frac{1}{4}$. Federal aid, he further suggested, should be on a 60-40 or 67-33 basis, rather than the present 50-50 or the oft-proposed 75-25 ratio. Mr. MacDonald warned against any relaxation of axle load limits. "We must give utmost effort toward the control of post-war speeds and accidents and toward the planning of highways more attractive in appearance, durable and economical to build."

Hadden Defended F. A. Status-Quo, Pleads for Unity

Sam C. Hadden (Ind.), president of the Amer. Assoc. of State Highway Officials, charged the conference to consider its problems on a national basis, rather than sectional, state, county or city. The pending federal post-war road bill, based on recommendation by AASHO leaders, has a wide public approval, he said. The public isn't concerned with seemingly petty details of fund-splitting and the highway officials' job is to iron out differences and help make this bill the best one possible by supplying facts and advice to congressional leaders. The old $\frac{1}{3}$ - $\frac{1}{3}$ - $\frac{1}{3}$ formula has served pretty well since 1916, he feels, and a radical proposal may tempt Congress to eliminate all formulae in favor of a "need" basis that would lead to undue political control of funds.

A national post-war road enactment soon is imperative, to enable designers to know what funds to count on between grade crossing eliminations, street extensions, and other types of work.

Chas. M. Upham, engineer-manager of the American Road Builders' Association, reviewed elements of the ARBA's post-war program, saying that probably every state in the Union must make some change in its laws before it can go along with any new federal road enactment.

Civil Aviation vs. Roads

Speaking on the probable future trend of civil aviation and its relation to highways, L. Welch Pogue, chairman, Civil Aeronautics Board, predicted half a million private airplanes some day. Yet he feels that

"TOUGHEST MOTOR GRADER ON EARTH!"



• Heavy rains and flooded roads during the pursuit of Rommel in Libya could not stop these "Caterpillar" Diesel Motor Graders, needed for leveling airfields.



"Toughest motor grader on earth!" . . . That's the way contractors and county officials have always talked about their "Caterpillar" Diesel Motor Graders. That's the way men in the armed forces talk about them today. For these rugged machines have proved themselves as versatile and dependable on the battle fronts as they ever did on construction and maintenance jobs at home.

"Caterpillar" is building them now at the greatest production rate in history. But motor graders are so vitally needed by fighting men that only a small fraction of the increased output can be spared for use elsewhere. And those few machines are allocated by the War Production Board to purchasers in war-essential work.

If it comes to a choice between repairing your local roads or rushing through an emergency landing field for hard-pressed Yank airmen, there can be no argument. We've got to win the war.

However, there's a brighter side. This same huge "Caterpillar" production will be available for civilian needs as soon as war and government regulations permit. There'll be no time out for retooling. The machines you get will be war-tested — up to the minute in every detail. They'll have the same unfailing power and traction, same ease of handling, same wide range of blade positions that have always made "Caterpillar" Diesel Motor Graders first choice.

In the meantime, many who need "Caterpillar" Diesel Motor Graders must wait for peace. Do your best to keep your present equipment going. Enlist the "Fighting Four" (Inspect, Lubricate, Adjust and Replace) for the duration. And if you reach the point where you must have a new machine, talk to your "Caterpillar" dealer. He will gladly explain how you can apply for it.

CATERPILLAR TRACTOR CO., PEORIA, ILLINOIS



• (Upper view) A fleet of "Caterpillar" Diesel Motor Graders at work on a big landing-field for Allied planes in the North African war zone.

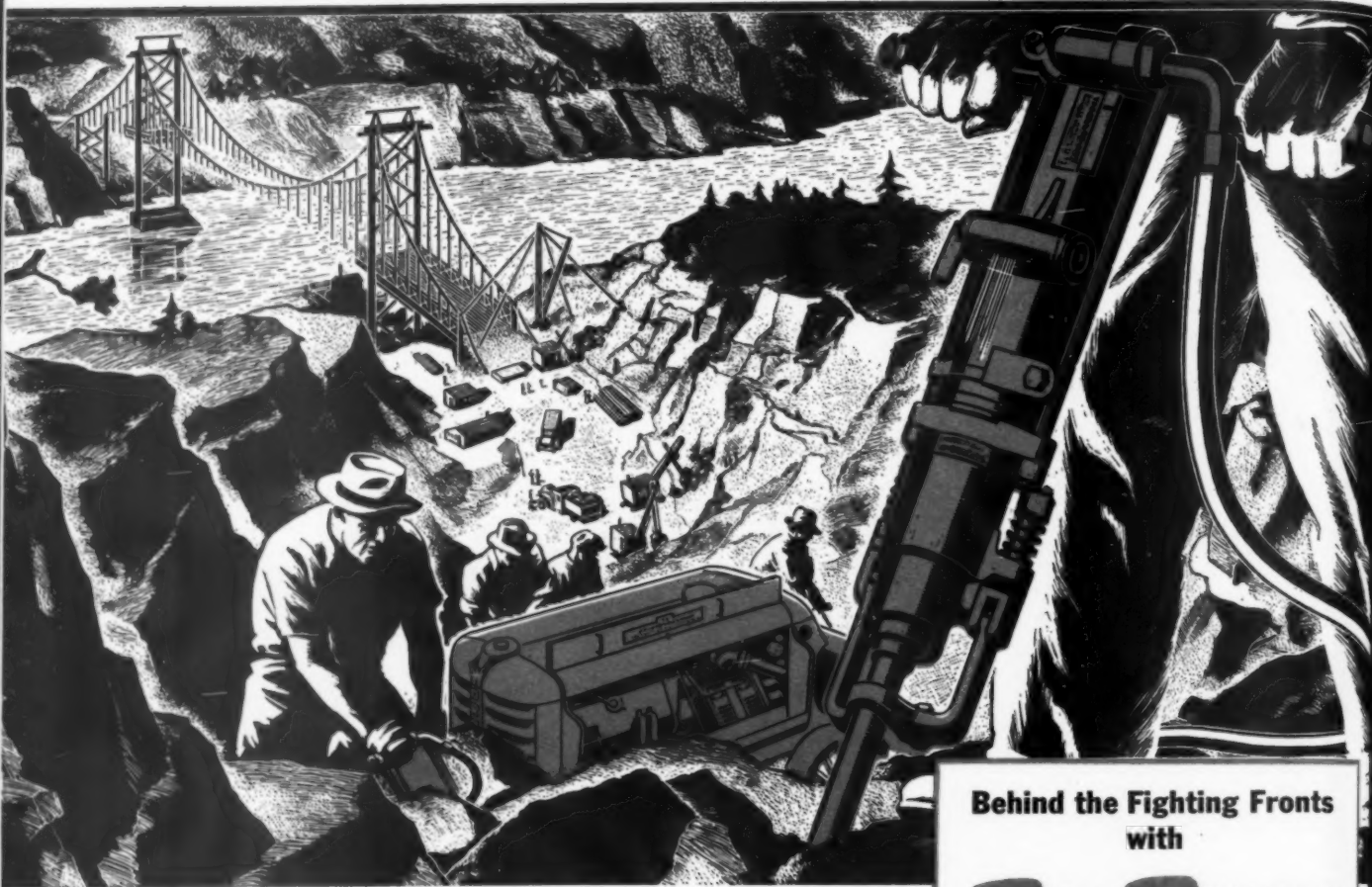
• (Bottom) In New Guinea, this "Caterpillar" Diesel Tractor with sheep's-foot roller and "Caterpillar" Diesel Motor Grader build a new air strip.

CATERPILLAR DIESEL

TO WIN THE WAR: WORK—FIGHT—BUY U. S. WAR BONDS!



TO CUT COST OF \$60,000,000 CITY IMPROVEMENT



Behind the Fighting Fronts
with

BLUE BRUTES

Blue Brutes in wartime girdle the globe. Colored olive drab for Army, battleship gray for Navy, they speed the flight of Fortresses from jungle air fields, help keep shell-shocked roads in occupied territories open to military traffic, and help build cantonments in the Arctic. On the Alcan highway, in Australia, on the Mediterranean fronts — and in hundreds of Army camps, Navy yards, air bases and ordnance plants here at home — Blue Brutes help the men who fight for our future. Your nearest distributor is listed on page 77.

You'll want to know now what Blue Brutes can do, because some day you'll be bidding on jobs like this one:

A post-war development program for Portland, Ore., involving three new bridges, a complete new system of "thruways", a \$10,350,000 sewage disposal plant, 6 grade school buildings, railroad depot, etc... Expenditure: \$60,000,000 in 2 years for construction alone.

If every new compressor and air tool you buy saves only a fraction of a cent per foot, they'd still be worth big money on jobs like that.

Worthington Blue Brute compressors, like the one shown here, cut costs because

they're made for easier breathing. Impact-free Feather Valves* which give Blue Brutes the nearest mechanical approach to human breathing, have Nature's simple strength.

You'll find a model of Blue Brute for any compressed air construction job when this war's over. Portable or semi-portable. Diesel, gasoline or electric-driven. And Blue Brute Rock Drills and Air Tools, which use less air, will help you get more worth from air delivered.

So, when you're figuring costs on that big job of tomorrow, bid with Blue Brutes in mind. They'll back the bid with what it takes to keep costs down. And that's your money's worth.

*REG. U. S. PAT. OFF.

Get more **WORTH** from air with **WORTHINGTON**
BUY BLUE BRUTES



Compressors from 60 to 500 cu. ft. capacity in mounts to suit all jobs. Rock Drills and Air Tools that have

always set the pace for easy operation — available in a wide range of weights and sizes.

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Holyoke, Massachusetts

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Rock Drills and Air Tools.

See full page ad page 76

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UTAH—Salt Lake City—The Lang Co.
VIRGINIA
Richmond—Highway Machinery & Supply Co.
WASHINGTON
Seattle—Star Machinery Company
Spokane—Andrews Equipment Service
WEST VIRGINIA
Fairmont—Interstate Engineers & Constructors
WISCONSIN
Eau Claire—Bradford Machinery Company
Green Bay—Nelson Machinery Company
Madison—Western Equipment Company
WYOMING
Cheyenne—Wilson Equipment & Supply Co.

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such growth will stimulate more rather than less highway travel. Eighty-four per cent of pre-war auto use was for trips of less than 20 miles and 90% for less than 30 miles, only 0.4% being for trips of 250 miles or farther; this fundamental fact of auto use assures against encroachment by air travel. (CAA now has 500 applications for new post-war commercial air routes totaling 500,000 miles, and 140 proposals are in the public hearing stage).

Third speaker to debate the F.A. formula question was president-elect Wm. J. Cox (Conn.), who put his views in strong language: Why a formula instead of a basis of need? A fund formula must be based on need or it is not justifiable. . . . Obsolete things should not be preserved at the expense of retarding national progress, and the present third-third-third ratio has been obsoleted by population trends.

He characterized the present HR-2426 bill as inadequate because it seeks to preserve a status quo. Our business is not to give Congress what we think it will pass, or what we'd like to have it pass, but to give it facts on actual needs so that its leaders can act wisely in the national as well as local interest. Mr. Cox championed another bill, HR-4170, as sound. It proposes to continue federal aid on the old formula for the present, until PRA can study the respective highway needs of states and regions as basis for a future bill based on actual road use.

British Post-War Program

Spencer Miller, Jr., state highway commissioner of New Jersey, recently back from a special advisory mission in England, told of Britain's post-war program, which differs from ours because of the bombing damage and profound social changes brought by war. English people, faced with graver problems, show greater willingness to adopt new concepts than Americans. English plans for housing and public works are based on a 2-year transitional post-war period, followed by a 10 and a 50-year period. An ambitious plan for new radial and belt highways for London is noteworthy.

Thos. H. MacDonald, Public Roads Commissioner, spoke briefly, but took time to stress the soundness of the recent Inter-regional Highway Report, which grew out of state traffic-flow data Inter-regional highways as proposed follow closely the paths of travel established since pioneer days. He cited the next great highway task to be completed, that of measuring the value of second and third class

roads against local needs and land utilization.

Motorist's Viewpoint: Not Higher Gas Taxes but Less Diversion

One of the best talks was that of Russell E. MacCleery, northeastern representative, National Highway Users Conference. Speaking from the motorist's standpoint, he counseled officials to avoid over-development of inter-city or transcontinental express facilities, since few vehicles make long trips (actually only 300 a day go from coast to coast in normal times). He also condemned the federal handout seekers, reminding that it is impossible to ask for more federal aid and in the same breath expect less federal control.

"We mustn't look for any increase in motor vehicle or gasoline tax rates," said Mr. MacCleery, "because the public is thoroughly tax conscious and will not stand for it. Greater highway revenues must and will come about through increased highway use after the war."

Diversion continues to be a threat against highway progress. Over \$200,000,000 of state road funds are now annually diverted to non-highway use. However, 14 states have constitutional amendments prohibiting such use, four have recently enacted such amendments and one more (Kentucky) is in process. On the other hand, one state legislature is rewriting its laws to put all public funds in one pot, thus paving the way for non-highway use of road money.

Even more serious is the dispersion problem. In some cases states must issue and reissue bonds to do any new road building at all, because such a large part of funds must be divided among local jurisdictions. Mr. MacCleery cited Vermont as a state that has enjoyed healthy highway financial conditions because it has kept the public enlightened through a sound public relations program.

New York States Future Program Far Advanced

New York State's unique post-war public works progress and the organization which has made it possible were reviewed by the state superintendent of public works, Charles H. Sells. Preferring the term "deferred works" instead of "post-war," he explained the coordinating function of the New York Post-War Public Works Planning Commission. While initiation of projects is left to the municipalities and other state agencies, the commission does furnish personnel to assist other bodies in properly compiling and analyzing projects for sub-

(Continued on page 96)

☆ ☆ With Road Builders in Uniform ☆ ☆

From the South Pacific to England and from the Aleutians to Burma you'll find them serving today . . . the thousands of roadbuilders who've gone out from contracting firms, state highway departments, and county, city and federal engineering posts. Here is news of a few of them. More next month. Send us your items!

Ohio Flag Has Many Stars

The Ohio Department of Highways, reports director H. G. Sours, has 1,237 stars in its flag (as of Feb. 28, before they started inducting more papas). Nine are women. Eight have given their lives. Twenty-one headquarters staff engineers are included, mostly now with the Corps of Engineers or the Navy Construction Battalion. The Department is particularly proud of the 528th Ordnance Company, which was recruited in 1942 from highway personnel.

Among former key Ohio highway executives are the following known to many R & S readers:

Major General Robert S. Beightler, commanding the 37th Division, Ohio's own. General Beightler was formerly Director of Highways, leaving that position to assume command of the Ohio National Guard prior to its call to active duty. Ohio, and especially the Department of Highways, is justly proud of the accomplishments of General Beightler and the 37th Division in the South Pacific theater of operations. He has received the Distinguished Service Medal and the Legion of Merit.



Major General Beightler

Major N. H. Truax, Corps of Engineers, Headquarters 9th Service Command, Fort Douglas, Utah. Former Division Engineer at Sidney, Ohio.

Major Homer E. Anderson, Corps of Engineers, Fort Belvoir, Virginia. Former Division Engineer at Ravenna.

John F. Laboon, former director, Allegheny county dept. of public works, Pittsburgh, Pa., is now a Lieut. Colonel attached to the Allied Control Commission and stationed in Italy. His present address is: Lt. Col. John F. Laboon, O-510616, Forward Echelon, HQ 2675th Rgt. A.C.C., APO 394, c/o postmaster, New York, N. Y.

Robert H. King, who was president of the Indiana Highway Constructors,

Inc., in 1942-43, is now Lt. Commander King, Mare Island Naval Base, San Francisco, according to word from W. M. Holland, secretary of the contractor group. He was reelected president again for 1944 by his fellow contractors as a token of appreciation for services rendered.

A. O. Torgerson is a Captain, formerly District Engineer for District 4 of the Minnesota Highway Department, now on leave, Corps of Engineers and Area Engineer at the Gopher Ordnance Works at Rosemount, Minn. Before his assignment to the Rosemount project, he was Chief Engineer for the Sioux Falls, South Dakota Airport; Area Engineer for the Watertown, S. D., Airfield; Rosecrans Airfield at St. Joseph, Mo.; Wichita Municipal Airport, Wichita, Kan.; and special assistant to the District Engineer for the Kansas City District, Corps of Engineers.



Capt. A. O. Torgerson, Minnesota

Joseph C. Robbers, now a Major in the Engineers Corps, was an employee of the Minnesota Highway Department from 1919 until he entered service in 1942. He served as Southeastern District Engineer, 1928 to 1937, when he became Assist. Maintenance Engineer. As an Area Engineer he was in charge of construction of the Sioux Falls, S. D., Airport, the Heart Mountain Japanese Relocation Center at Cody, Wyo., the airfield at Glasgow, Mont., and was in defense work in Northeastern Canada. Major Robbers was a "2nd Luie" in France in 1917.

Fulton County, Georgia, is proud of its service stars which according to Chief of Construction, A. A. Clarke, include the following well known Atlantans: Lt. (j. g.) A. T. McDonald, U.S.N.R., Camp Peary, Virginia; Capt. Mortimer L. Goldman, No. 0363275, Batry. A, 168th A.A.A., Gun Bn., APO 927, c/o postmaster, San Francisco; Capt. A. C. Crockett, 21st Ord., M.M. Co., APO 301, c/o postmaster, San Francisco.

Lt.-Comm. W. R. Shriver of the Sea-Bees, former contractor and director of the So. California Chapter of AGS, is on his second tour of duty in the Navy, writes F. J. Connelly of AGC. (Navy Medical Corps in World War I, serving in the Atlantic and at Murmansk.) Present whereabouts not divulged. He is well known as a western construction man in various highway fields, having served as construction superintendent for Lewis Construction Company and for Ford J. Twaits-Morrison Knudsen, and as a partner with George J. Bock and with Charles Rhoades. Later he formed his own contracting firm, and was a AGC Chapter Director when commissioned. Home is Glendale.



Lt. Commander W. R. Shriver

Sultan G. Cohen, formerly a partner in McMahan Construction Co., and Board member of Indiana Highway Constructors, Inc., Rochester, Ind., is a Lt. Colonel, U. S. Corps of Engineers and his mail address is ASN-0155670, APO 689, c/o postmaster, New York City (Somewhere in India). First commissioned a Major and assigned as Area Engineer at Camp Breckinridge, Ky., he won his promotion last June and was assigned to the Burma Road. Family address, 5201 N. Meridan St., Indianapolis.

Charles A. Kahl, former construction engineer with the Indiana highway commission and later active in bridge construction, is a Lieutenant, 334th Engineers, Regiment Co. B, APO 680, c/o postmaster, New York, N. Y. (Which means Iran). Mrs. Kahl resides at Liberty, Indiana.

Karl F. Jacobsen, of the Portland, Ore., road contracting firm of Jacobsen-Jensen Co., and a former director of the Portland AGC chapter, is a Lieut. serving as an Aviation Engineer with the Corps of Engineers. At last report he was in Algiers, presumably on way to India.



Lt. and Mrs. Karl F. Jacobsen

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Dry Weather Coming

By HALBERT P. GILLETTE

AS stated in previous articles there is a series of powerful weather cycles, each of which is three times as long as the next shorter one. I call it the triple-progression series. The length of a cycle is the time interval between its maximum effects. One of the cycles of this series is 67 years long. It had its last cold-wet maximum in 1883, in most regions; but there were some localities where the phase was inverted, and a warm-dry maximum occurred. Its next cold-wet maximum will occur in 1950. One of its sub-cycles has a length of $1/9$ of 67 or about 7.44 years, whose next warm-dry maximum will occur Oct. 20, 1946. There is another subcycle whose length is about 2.48 years, whose next dry maximum will occur May 1, 1944. In recent weeks its drought effects have been felt in many regions, and will grow progressively worse until May 1, after which they will slowly lessen.

This last named cycle is nearly 30 months long. It has subcycles of about 10 months and about $3\frac{1}{2}$ months, or, more exactly 100.7 days. And there are cycles of $\frac{1}{2}$, $1/9$ and $1/27$ of 100.7 days. All cycles of this triple-progression series are harmonic; hence when a maximum effect of one of the longer cycles occurs then a maximum effect of all the shorter cycles in the series occurs. Hence by studying the effects of the shorter cycles in any given locality, the effects of a longer cycle can be foretold with considerable accuracy as to that locality.

Unfortunately these triple-progression cycles have "competitors" that at times are strong enough to override their effects. Each of the 9 largest planets (including Ceres) tends to cause a rainfall cycle whose maximum occurs when the planet is in longitude 289 degrees, viewed from the sun. The Earth is in that heliocentric longitude July 12. Six months later there is a dry maximum in many regions, but in some regions (notably our Pacific slope states) its phase is inverted, and the wettest period is usually in January.

The tracks of storms entering America from the Pacific tend to shift southward near rainfall cycles, notably the $22\frac{1}{2}$, the 67 and the 201-year cycle. The converse occurs near rainfall minima. This is one of several causes of opposite phases of cycles in different latitudes. Failure to un-

derstand phase inversions has often led meteorologists to be skeptical even as to the eventual utility of cycles for forecasting purposes. While much remains to be discovered about phase inversions, enough has been learned to make it highly probable that this problem can be fully solved.

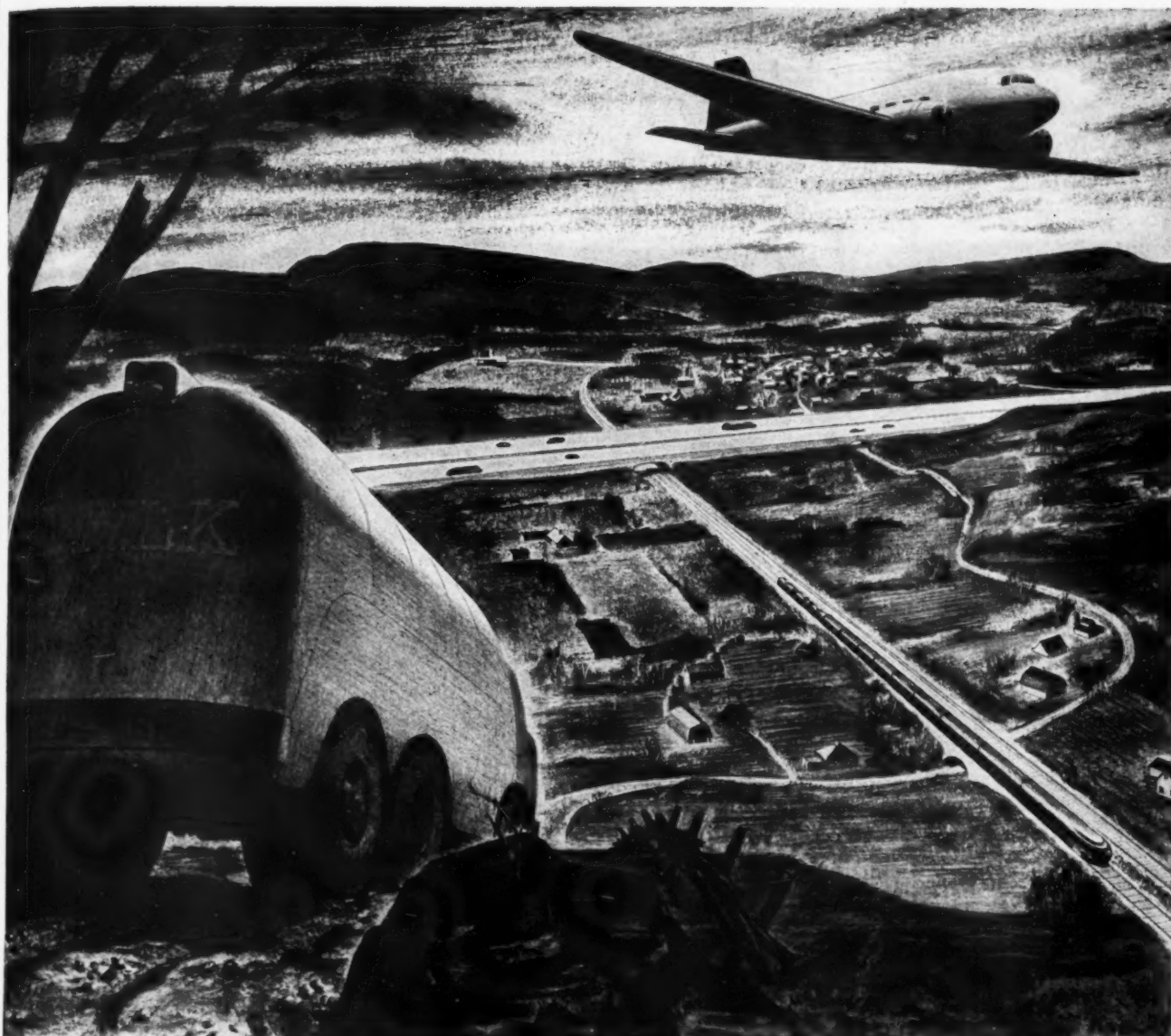
The shorter the cycle the greater is the difficulty of forecasting its effects in any given locality. Topographical conditions are a factor in the direction that storms travel, as well as in the amount of rainfall that a given air-whirl will produce. And there are other local differences that give complexity to the problem. One of these is, I believe, the existence of local magnetic poles in the earth's crust, the number of which is great, and the presence of which affects the number of electrons in the air near such poles. Electrons serve not only as nuclei for the condensation of atmospheric moisture, but they reflect some of the solar heat back into space. As a result of such reflection the underlying air becomes abnormally cool. Carried to an extreme and, prolonged for centuries, this is, I believe, the cause of ice-ages.

The 201-year cycle and all its sub-cycles will cause a warm-dry maximum in January, 1984, but long before that event, the shorter cycles of the triple-progression series will produce increasingly severe droughts. In fact, they have been doing just that since the warm-dry maximum of the 67-year cycle in 1917. Beginning then the rings of pine trees in eastern Oregon became thinner than they had been in 650 years! This led me to infer that a cycle much longer than the 201-year cycle was at work. By studying rock strata in which varves (annual layers of sediment) exist, I found longer cycles in the triple-progression series, notably cycles of 603, 1809 and 5427 years. Varves measured in a core taken from the bed of an existing lake show that the 1809-year cycle had its last wet maximum in 1079 A.D. Hence its next dry maximum will occur in 1984. There is good evidence that the 5427-year cycle will also have a dry maximum in 1984.

In a forthcoming booklet on "Cycles and Their Causes," some of the evidence as to these, as well as longer and shorter, cycles will be given. A copy of that 80-page booklet will be sent free on request to any reader of this magazine.

How long
By air,
your water
express-h
that. Mile
But the
the sho

New York
Providence
Syracuse
Norwood,
in Canada



•BUY MORE WAR BONDS

THE LONGEST MILE

How long is a mile?

By air, about as long as your watch. By

express-highway, about as long as that. Miles

But the longest mile is the one that has

been neglected, handicapping local business and denying millions of people

the requirement of highway

Above is an excerpt from a Barrett Saturday Evening Post advertisement which points out that *the longest part of a journey is often a short distance over a worn-out, broken-down highway*. Too often these neglected highways are important links in a major transportation system . . . feeder roads that should provide quick, easy access to primary routes.

Post-war construction of new multi-lane arterial routes will never completely solve this country's highway problem. The first responsibility of highway engi-

neers will still be to "even up" the miles for everyone—to provide the easy-riding, all-year secondary and feeder roads that are essential for local traffic and business.

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ROADS AND STREETS, March, 1944

Maintenance of Traffic-Bound Roads Under Heavy Armored Traffic

The following article is based on recent experimental work, the greater part of which was performed on the roads at Camp Campbell, Kentucky. Calcium chloride treatments successful; careful preliminary conditioning of road surface an important factor

AT army posts, where armored forces are trained, it is necessary to maintain all-weather access roads for the use of both tanks and wheeled vehicles moving between training and cantonment areas. The destruction of these road surfaces by armored vehicles causes maintenance problems which are rarely, if ever, encountered in peacetime highway work.

At certain periods of the day, there is an extremely heavy concentration of traffic on access roads, especially in the vicinity of the cantonment area. In wet weather, as the tanks travel from the training areas toward the motor parks, large quantities of mud are carried and deposited on the roads. In dry weather, dust clouds resulting from mud depositions are not only an annoyance, but create conditions which are very dangerous. Vehicle operators are compelled to wear dust masks, and many serious accidents occur because the vision of drivers is obscured. Visibility often is less than 25 ft. In concentrated traffic, consisting of columns of tanks interspersed with jeeps, staff cars, trucks, half-trucks and motorcycles traveling in both directions, the hazards of traveling these roads can be readily visualized.

The abrasive action of steel cleated, heavy tank tracks grinds chert or limestone surfaces to a powder on the more heavily traveled roads. Actual loss in road metal thickness was measured and found to average between $\frac{1}{2}$ in. and 1 in. per month. The road metal at all times was covered with a thick layer of fine dust. With limited manpower for maintaining these roads, and with equipment lacking in both quantity and suitability, the maintenance engineer has a real problem in keeping access roads open to traffic at all times without interfering with the troop training program.

Various Solutions Considered

Replacement of traffic-bound roads with concrete was considered, but discarded due to the extensive mileage and the large expenditure involved.

In order to provide satisfactory traffic-bound access roads for armored

By **LT. COL. B. F. HATCH**
Director, Repairs and Utilities Branch, Fifth
Service Command
and

HAROLD G. DILL
Chief, Roads, Railroads and Grounds Unit,
Repairs and Utilities Branch, Fifth
Service Command

traffic, it is necessary that maintenance accomplish three things: first, mud must be removed; second, dust must be controlled; and third, loss of road metal must be reduced.

Accumulations of mud when allowed to remain on the roadway not only interfere with the movement of traffic, but become incorporated with the road metal and cause a reduction in load supporting capacity. If permitted to remain, mud accumulations result in eventual complete deterioration of the road. Control of this problem was solved by blading the daily accumulations to the shoulders and periodically picking up the mud stored on the berms with standard dirt-moving equipment and depositing it on the edge of fills or in areas off the highway.

Drainage to the road side ditches was maintained and the side ditches kept free of mud deposits.

Calcium Chloride Applied at Night

Control of dust using bituminous palliatives, was not considered the best solution here for several reasons: periodic local repairs to pavement structure must be made, due to the gouging action of tank convoys in turning from the main road; the necessity of blading mud from roads at frequent intervals; the low cementing value of light bituminous materials; and the wartime restrictions on use of these materials.

The use of calcium chloride was the method adopted for control of dust. A practical method of conditioning the roads prior to the application of the calcium chloride was necessary in order that the greatest possible value could be secured from the application of this material. The heavy cushion of fine stone dust and clay was removed, using a patrol grader, followed by two road brooms

exposing the consolidated road metal. All pot holes were repaired and stabilized. Calcium chloride was then applied by means of a rotary spreader at the rate of about $1\frac{1}{2}$ lb. per sq. yd. for the first application.

Due to the intensity of the traffic, most of the roads were conditioned and all of the chloride was applied at night. This method not only allows the chloride to absorb the additional moisture in the air at night and eliminates the necessity for sprinkling, but also provides more time for the chloride to permeate the interstices of the road metal without disturbance by traffic.

The result of this treatment was a firm, tight-bound, glazed surface not easily displaced by the steel-tracked tanks, even on turns. The dust was practically eliminated and the abrasive wear on the aggregate was greatly reduced. When the surface began to dry out and some dusting occurred, additional applications were necessary at a rate of between $\frac{1}{2}$ and $\frac{3}{4}$ lb. per sq. yd. By brooming the road surface prior to each subsequent application of calcium chloride, the dust was controlled and this hazard definitely eliminated. While actual wear under the steel grousers still occurred to some extent, the road metal was displaced in very few locations, and these were successfully controlled by calcium chloride patching.

Particular care must be exercised in planning late applications of calcium chloride, as the retained moisture combined with seasonal moisture may weaken the base, and failures will occur under tank traffic.

Approximately 4 lb. of calcium chloride per sq. yd. was used per year at a cost of about \$770 per mile or \$0.06 per sq. yd. The use of this material was definitely justified from the standpoint of health, safety, convenience, and economy in preventing loss of road metal.

Somewhat better results were obtained by applications on limestone roads than on chert roads. Results secured were directly proportional to the care taken in conditioning the roads prior to the application of the calcium chloride.

Counties Making Post-War Progress

Reports from typical counties show sketchy efforts at advance engineering; slowed in some instances by "waiting on Washington" as well as on lack of designers

Linn County, Iowa. Writes County Engineer Wm. H. Behrens, Cedar Rapids:

For some time we've had plans ready for extending our central repair shop; probable cost, \$25,000. Plans are in progress for two major bridges, and minor structures are scheduled. Only about 10 miles of grading plans are out. Not enough, but we're getting more . . . \$111,000 cash balance in construction fund and budget balance \$134,000. Linn County roads haven't suffered much wear and tear to date, but . . . with about one-third of our road mileage unsurfaced there will certainly be more wartime deterioration. We have about 1.6 miles of truss bridges dating mostly from before 1900. ("Wonder if the Spanish-American and World War I gave them additional strain; they do look tired.")

Hennepin County, Minn. From W. E. Duckett, County Highway Engineer, Minneapolis:

Considering three new highway bridges over the Minnesota River and two railway grade separations . . . working on plans for routine road improvements which will take all our regular construction funds, about \$100,000 per year.

Winnebago County, Ill. Report from A. R. Carter, County Supt. of Highways, Rockford:

A post-war plan developed for a period of 6 years in Winnebago County, Ill., includes three new concrete roads and sections of secondary type consisting of grade and drain and crushed stone, later to be bituminous surfaced.

Two river bridges are also included. A brief summary by years:

First Year	
Concrete Paving	\$ 93,000
Crushed Stone Surface . . .	137,600
Bituminous Work	74,750
	\$ 305,350
Second Year	
Concrete Paving	\$ 70,700
Crushed Stone Surface . . .	130,700
Bituminous Surface	49,800
	251,200
Third Year	
Crushed Stone Surface . . .	\$172,000
Bituminous Surface	60,230
	232,230
Fourth Year	
Concrete Paving	\$140,000
Bituminous Surface	53,900
	193,900
Fifth Year	
River Bridge and Approaches	\$270,000
	270,000
Sixth Year	
River Bridge and Approaches	\$300,000
	300,000
Total Six Year Program . . .	\$1,552,680
FINANCES	
Permissible County Highway Levy (annual)	\$ 104,000

Motor Fuel Tax Funds (annual)	150,000
Motor Fuel Tax Funds on hand and not obligated, Jan. 1, 1944.	192,424
Refunds due from State, Jan. 1, 1944	307,642
County Highway Fund Balance, Jan. 1, 1944	71,922

Estimated Income for six-year period	\$2,090,000
Estimated Expenses—six-year program	1,552,680

Balance for maintenance and other construction	\$ 537,320
--	------------

Plans are 100% completed for one concrete section and 75% complete for another; 100% complete for 4 mi. of grading and stone surface, and 80% for another 6.5 mi. Surveys are also complete for 20 mi. additional grading and stone surface, also for two bridges.

No plans are required for bituminous surfaces, as reference is always made to previous plans. Estimates have been completed for 15.5 mi. bituminous work. Winnebago County is in very good shape to start this program as soon as labor is available and construction work is again permitted.

Lancaster County, Neb. From Louis W. Weaver, Engineer, Lincoln:

Now working on plans for several post-war road and bridge projects.

Probably most interesting involves several new bridges over the new channel of Salt Creek (drainage area 700 to 1,000 sq. mi.), whose straightened channel has widened and necessitated replacing the old used trusses now in service.

Plans are completed for six new 200 ft. bridges at \$25-30,000 each.

Sanitary District No. 1 is now straightening, widening and deepening Salt Creek immediately west of Lincoln. This project will require many new bridges including several railroad bridges. New county bridges required together with highway changes will cost the county \$75,000. Plans now in preparation.

We are gradually losing men and our forces have reached a point where only emergency work can be done. This county has in excess of 6,500 drainage structures, including 700 wooden bridges, yet we have a bridge crew of only four men, which can take care of emergency repairs only.

Our road maintenance crews have been reduced to urgent necessary road dragging and maintenance. We have been able to purchase gravel and materials, and keep our equipment in good shape although delays on parts

have kept machines tied up in the shop.

Under these conditions balances are increasing in the road and bridge funds, although not as fast as anticipated due to increased costs of labor and materials and a reduced income from the gasoline tax.

If the war should end in two years, our funds would not start a large construction program because of the need of purchasing much new equipment and the reconstruction of many roads.

Los Angeles County, Calif. Writes O. F. Cooley, Road Commissioner, Los Angeles:

For a year or more this office has been making up lists of desirable projects which, in many instances, have been designated as post-war plans or post-war projects. These lists, no doubt, have a certain value, but the time eventually comes when we need more than lists—we need actual construction plans which can be submitted to our board with appropriate specifications and bids called for. Engineering personnel with the ability and experience to prepare this type of plan is extremely scarce, if not entirely unavailable. Looks as if we will have to content ourselves for a while with the preparation merely of lists of desirable projects.

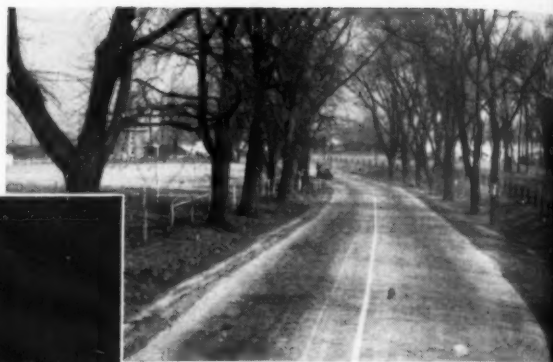
After consideration we've come to think of a reservoir of projects for use at an appropriate time, rather than a list of projects to be attempted after certain events take place. Several projects in our current budget are of enough importance to the war effort to warrant undertaking at the present time. Since L. A. County is an area of intense war activity, probably a number of projects have been authorized for construction soon.

We believe that we must work gradually into the reservoir of projects which are available. Some of these will be done this year, some next, and some will not be attempted for several years. One of the important factors is trained personnel for plan preparation.

Ventura County, Calif. Reports R. L. Stump, County Surveyor, Ventura:

It is intended to present a \$1,250,000 post-war highway and bridge program soon, to include reconstruction of existing highways and a small

Hiner Road bridge. This old, narrow structure, with loose limestone abutments and weak plank floor, was replaced with a modern slab bridge. Typical of numerous post-war projects being prepared for "immediate" construction by Franklin County



Olentangy Road. An arterial which carries one of the county's heaviest traffic concentrations from the north and northwest part of Columbus and surrounding county into downtown. A 0.9-mile section just out of the city limits was rebuilt and "double-tracked" as shown. Old pavement was narrow, winding, slippery when wet, steep in spots. New road consists of two 30 to 32 ft. pavements plus curb and gutter. Note slight step-down at gutter lines, indicating provision for future addition of bituminous concrete wearing course



Recent "Before" and "After" Road Scenes in Franklin County, Ohio—Examples of

amount of new roads. Reconstruction will include widening of pavement for safe two-lane highways with the necessary drainage extensions.

Minnehaha County, S. D. From F. H. Schrader, Superintendent, Sioux Falls:

Plans for bridge replacements total \$200,000 . . . surveys and plans are nearing completion on about one-half, the remainder by spring. Some progress on plans for 50 mi. of bituminous surfacing, on grades completed prior to the war. These plans can be completed to a status ready for letting with very little work.

Funds have accumulated here, due to the closing down of construction and small recent expenditures for snow removal. They should adequately support a program of around \$400,-

000 over a period of three years without federal matching.

Franklin County, Ohio. Writes County Engineer Allan Slade:

Our post-war program is for two years' duration, and is scheduled for 6-month periods from Jan. 1, 1944. The projects for Jan. 1, 1944, for example, include only projects for which construction plans were ready on that date.

Our No. 1 project is the \$1,780,000 Sandusky St.—NYC grade crossing elimination, which will include a 6-lane bridge over the Scioto River, relocation of the railroad, grade separation at Sandusky St. and also grade separation structures on Xouder and McKinley Avenues. Plans are ready for a third of this work, and the remainder including the \$600,000

Scioto bridge and railroad trackage can be finished up as needed.

Program "A" also dated January, 1944, and ready-to-go, comprises 33 highway projects totaling \$689,000, ranging from a 4.5-mi. macadam job at \$125,000 to ditch enclosures, culvert extensions and drainage structures as low as \$1,000.

Work to be blue-printed if necessary by July 1 comprises 17 jobs at \$590,000; Jan., 1945 projects, \$550,000; July, 1945, projects, \$1,074,000; Jan., 1946, projects, \$879,000. Extensions of present arterials are the major post-war projects for study.

Leavenworth County, Kans. W. V. Thomas, County Engineer, Leavenworth:

Of course we intend to do a lot when the time approaches but at this



Old 160-ft. covered wood-truss was in poor condition. The siding and roof were removed, thus reducing dead weight and improving light and safety. Two intermediate piers, built to bolster up the span, are located for post-war completion of a 3-span steel-beam concrete-deck bridge



Agler Road, near Columbus, showing damage from heavy hauling between the Army Service Depot and Curtiss-Wright plant, and restoration by county maintenance forces. Work consisted of sub-base drainage, base replacement and 60-lb. drag treatment. Franklin County has had to do extensive wartime repairs of this kind, faces much more such work

the Types of Post-War Improvements Being Planned by Counties Everywhere

writing we are unable to secure any engineers or help to get up plans.

Our biggest job is to keep the wheels rolling and get the farm products to markets and that means the best kind of maintenance under present difficulties. We are in the midst of war plants, with Fort Leavenworth at one end of the town, a ship yard at the other and in close proximity to the Sunflower ordnance plant, causing great difficulty on account of the fierce competition for manpower. Only by appealing to their patriotism have we been able to keep a force busy in maintenance. Our equipment is old and very much worn, and it is a problem to keep going. However, to date we have done the job.

Richland County, S. Car. From Charles F. Lynn, County Engi-

neer, Columbia, South Carolina.

Richland County has scheduled about 85 mi. of highway improvements, including bridges, drainage structures, sidewalks and curb-and-gutter as its post-war program. Work will cost about \$4,000,000 and extend over six years. However, no plans for financing have been arranged. Neither have plans or surveys been started.

Stearns County, Minn. Reports J. S. Schmit, Highway Engineer, St. Cloud:

A careful study of our highway system has been made and projects listed which should receive immediate attention, consisting of grading, surfacing, structures, crossing signals and general highway and bridge repairs. This has resulted in a FAS program totaling 200 mi. of grading,

90 mi. of bituminous surfacing, 7 bridges, 3 grade separations and 3 automatic crossing signals. Cost estimated at \$1,500,000 for a 4-year program based on 75% federal aid. Other projects would be added as funds permitted. At the present time we have no obligations and a reserve will probably be built up so as to finance immediate construction whenever necessary to relieve unemployment.

A county post-war planning board has been formed to co-ordinate all types of construction, such as highway and street improvements, schools, airports, conservation and drainage projects. It will be the duty of this board to program the work as to amount and location, depending on the unemployment situation in the various localities.

Editorial

HOW CAN WE SPEED UP THE BLUEPRINTING?

STATES, counties and cities still face a huge task in getting finished blueprints drawn and in making necessary field surveys for their post-war highway programs.

While the list of needed improvements has soared to \$16.5 billions, the tally of projects ready now, or are likely to be ready within a year, is alarmingly small by comparison. Counting deferred pre-war projects, the states will have about \$700 millions ready for bid calls by June 1. Only \$1.4 billions in work, both state and local, will be ready by January, 1945, unless something drastic is done; that's only five to six months' work at the post-war pace we're aiming for.

Some good starts have been made. Progress by New York State and New York City is touched on in the North Atlantic highway meeting report, published elsewhere in this issue. Particularly cheering also is the current effort of the Michigan state highway department, which is reported to have ninety men in the drafting room and twenty-four field parties out.

Worst laggards are the counties and cities, according to Charles M. Upham of the Roadbuilders Association. A survey shows that less than half the immediate county work programmed would be ready by 1945. The percentage with the cities is still less. Most of the less populous counties have little funds available for planning.

The shortage of qualified engineers is admittedly acute, and in spite of the sharp falling off of war con-

struction in recent months the manpower situation hasn't improved.

Of course there is no one answer. Some departments are hunting ways to offer better wartime salary inducements. But low pay is still a prime reason for empty drafting rooms. Mere temporary upgrading isn't the solution. To compete with high general wage levels in this country after the war, highway commissions should act now to raise their general salary schedules.

Several states are awarding engineering work to private engineering firms. More of this can profitably be done.

Concentration on the simpler projects, such as pavement widening and culvert replacements, is one expedient, but there is a limit to that. Many desirable projects will require a great deal of advance engineering.

There is still another answer. That is for more officials and engineers to *make post-war advance engineering their first and most urgent order of business*. There is too much complacency, as for example with the city engineer we recently called on who said, "Oh, yes, we have a lot of streets we could stake out and pave when the time comes. But we don't need to do anything ahead of time."

What is needed now is a growing urgency to somehow get on faster with surveys and plans for honest-to-goodness non-WPA projects—and determination to find and bid for necessary engineering talent wherever it will not go counter to the war effort.

Collective Bargaining for Professional Engineers

(Continued from page 70)

exert their efforts toward conciliation of disagreements that may arise, thus minimizing the need for formal collective bargaining procedure.

That eligibility for membership in the Committee and in the bargaining group may be specifically defined, the following definition of "Professional Engineering Employee" has been proposed:

"The designation 'Professional Engineering Employees,' used in the sense that persons capable of being so designated may join with others similarly capable of being so designated for the purpose of collective bargaining separately from any other groups composed of persons not capable of being so designated, shall be that of only those who, excepting employers or those to whom employers have delegated managerial responsibility with respect to employment conditions, possessing an intimate knowl-

edge of mathematics and the physical sciences, gained by technological and scientific education, training and experience, and in a position of trust and responsibility, apply their knowledge in controlling and converting forces and materials to use in structures and machines, and products, and whose work requires the exercise of discretion and judgment, is creative and original and of such character that the output cannot be standardized; and those, who without the experience set forth, but having been graduated from an approved educational institution and having received the degree of Bachelor of Science or its equivalent, in Engineering, are engaged in engineering work."

Following the recommendations of the Board, 15 Local Sections have already amended their constitutions so that they stand ready to undertake bargaining for their membership. In the voting on the amendments in these Sections, an average of 93% of ballots cast have been in favor of its amendment.

It should be emphasized again that the American Society of Civil Engineers has recommended the formation of these collective bargaining groups for two specific reasons: first, to be of help to professional engineering employees needing assistance in employment matters, and second, to supply the machinery within the profession whereby professional engineering employees can bargain collectively in units of their own choosing under leaders of their own choosing.

Doubtless problems pertaining to the maintenance of the local groups and to the extension of their influence will arise from time to time. Such a positive action is bound to be beset with difficulties. Nevertheless, the directors of the oldest engineering society in the United States (1852) recognize that engineers must not relinquish their professional standing and attitude if they hope for the "advancement of the sciences of engineering," which is the prime objective of the formation of the Society.

Equipment Maintenance



In front of D. W. Winkelman Co.'s 110x545 ft. shop and garage building at Syracuse, N. Y. Bulldozer is snatching a flat car to position for unloading a new consignment of G.I. construction equipment

Contractors Help Overhaul Army Equipment in Northeast

How D. W. Winkelman Company is carrying out repair contract under the U. S. Engineer North Atlantic Division's policy, which is to utilize commercial facilities wherever practicable

YOU wouldn't expect to find the home shop of D. W. Winkelman Co. at Syracuse, N. Y., full of equipment right now. During February this firm landed a million dollar airport job in Mississippi, and their earth moving and paving outfit was shipped south in a hurry.

But just the same, their big 110 x 545 ft. shop and storage building—a converted industrial building on the outskirts of Syracuse—is jammed full of shovels, draglines, scrapers, tractors, pavers, rollers, etc., and more units move in and out by rail almost every day. The answer is, the Winkelman outfit is overhauling army construction equipment. It is one of several contracting organizations, equipment dealers and distributors now carrying a large part of the load in the North east on the huge job of renovating G. I. machinery for re-assignment.

Under the U. S. Engineers, Northeast Division, equipment has been



W. J. Fritchett, Winkelman's shop superintendent, and Robert Bird, master mechanic

withdrawn in a steady flow from offshore base projects and war construction jobs in the New York area and assigned to the most convenient or accessible of these contract shops.

Big But Not "Fancy" Layout

Winkelman Co.'s procedure is typical of the Army's program throughout the country. Its chief interest to

ROADS AND STREETS' readers perhaps lies in the fact that it gets a great deal of work out in spite of parts delays and does so with a limited organization and a minimum of special equipment. As in Army-owned or Army-operated shops set up for the same purpose over the country, the ultimate end is to put every unit in as nearly "new" conditions as possible, arriving at three general classifications — A-1 stuff with all standard parts, for over-seas assignment; second-string units for domestic projects; oldest units, for post maintenance work, etc.*

The Winkelman shop specializes in heavy equipment. On arrival each machine is snatched from the car by a small yard tractor and moved into the yard or shop. Tractors are given

*Army and navy policies in overhauling and re-assigning construction equipment are described in Sept., 1943, *Roads and Streets*, "How Army Overhauls Big Stuff at Fort Logan Shop," and in Jan., 1944, *R&S*, "Overhauling Navy Equipment for Overseas Duty."

GULF PRODUCTS help Hardaway Contracting Co. finish rush job ahead of schedule



Hardaway Contracting Company, Columbus, Georgia, averaged over 10,000 yards per day in grading the extension runways on this airport construction project. Gulf quality lubricants and fuels helped this contractor finish the job well ahead of schedule.



"The efficient and dependable performance of our equipment with Gulf Lubricants and Fuels was an important factor in our fast progress," says this contractor

GULF quality lubricants and fuels played a big part in our finishing up this rush airport job ahead of schedule," says Superintendent Roy Geise of Hardaway Contracting Co. "Gulf products contributed to the outstanding efficiency record of our equipment, and helped us avoid delays caused by mechanical troubles."

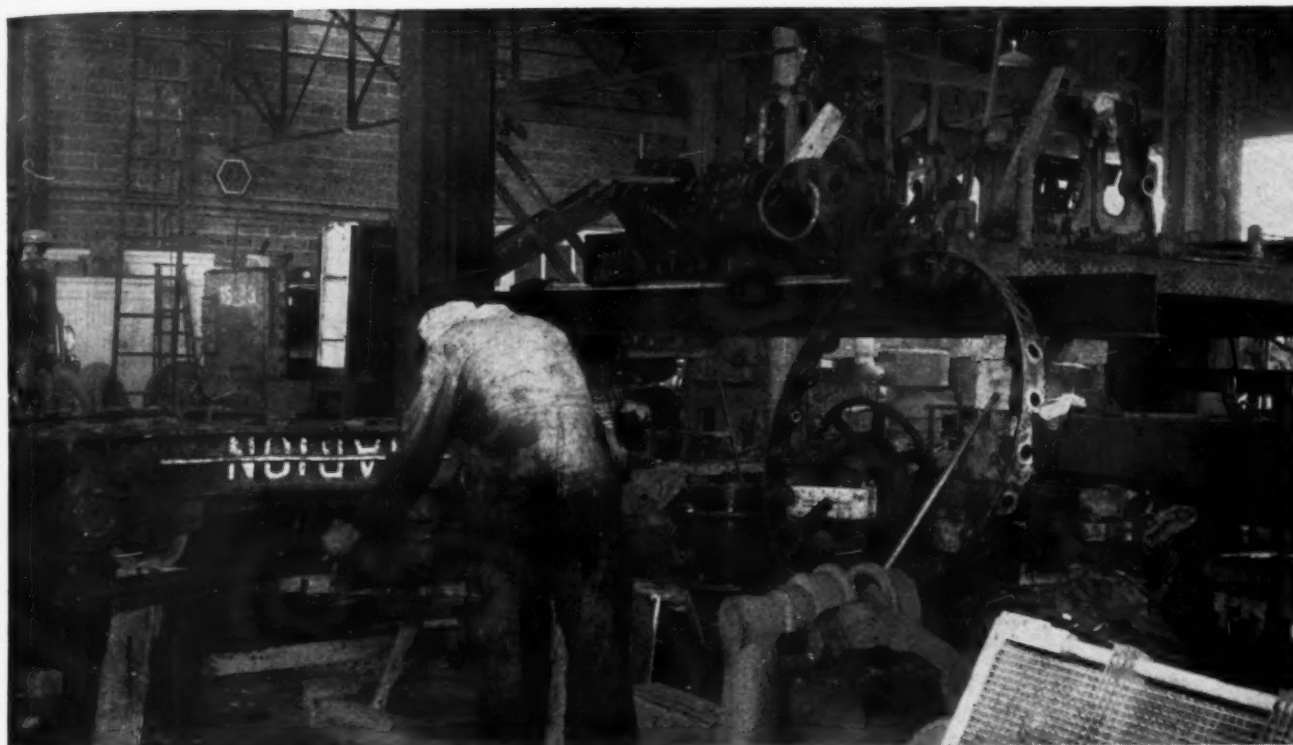
Here are some of the reasons why so many leading contractors rely on Gulf lubricants and fuels to help them beat contract schedules: Gulf lubricants have a performance-proven reputation for quality—they provide

the kind of lubrication that means full protection to equipment under punishing service conditions. And Gulf fuels deliver full power. Result: efficient operation of every unit, long service life, low maintenance costs, and a minimum of costly operating delays.

Call in a Gulf Service Engineer before you go to work on your next contract—let him show you how Gulf quality lubricants and fuels can help you do a speedier, more profitable job. Write, wire, or phone your nearest Gulf office today.



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ROADS AND STREETS, March, 1944



The main 110x100 ft. Winkelman shop room is equipped with high-level hoist and crane equipment to facilitate indoor dismantling of shovels and other big equipment. Shovel under-frame in foreground is turned upside down for welding

a general look-over for special wear and tear, but shovels and other larger units are inspected minutely from end to end, parts lists compiled and replacement orders dispatched to the factory. From experience Winkelman's men and the U. S. Engineers know about what tractor parts will be needed and supply lists are anticipated accordingly. But for most other equipment each machine is treated as a special parts order. No overhauling job starts until the boys know definitely what parts will be needed.

Parts Problems Here, Too

Part replacement is the crux of the whole job, in fact, and anyone who thinks that waiting for parts is exclusively a civilian grief will find out differently by visiting the Winkelman place. In spite of priorities, shovels sometimes have set dismantled for five or six weeks, waiting on certain parts from the overworked (or perhaps converted) home factory.

When a shovel, say, is moved into the 110 x 100 ft. main shop, a space is cleared for it, timber blocks brought around, and with the help of blocking and chain hoists the machine is torn down as completely as its condition requires, which often means all the way. All parts from that machine are carefully kept in piles alongside, and as fast as facilities permit they're trundled over into one corner of the room reserved for steam cleaning.

Motor and other precision parts are put in boxes and protected against dust with canvas.

Scarce parts that can be salvaged by welding with economy are moved to another corner when one or more welders are engaged. Salvagable parts that involve metal spraying, annealing or machining of rough welds are sent to commercial or distributor shops around Syracuse.

Factory Parts Preferred

Winkelman, however, strives to get factory-new parts wherever he can, and prefers to pass discarded parts on for salvage or use by others who have a lesser priority or are better equipped for salvage. Using new parts is cheaper for all concerned, and expedites the job, is the way Winkelman's shop superintendent, W. J. Pritchett and master mechanic Robt. Bird feel about it.

A specially designed stock room adjoining the shop, comprising sixteen ranks of open bins, suffice to take care of tractor and other smaller parts under a perpetual inventory system.

Motors to be overhauled are brought to a row of benches along one side of the shoproom. Here, too, the facilities are noticeably simple. A 60-ton, 2-stage drill press, several good bench grinders and drills, and the rest of the work is handled with hand tools or hand-held power tools or sent to specialty shops.

Motors torn down for any length of time are carefully hooded with dust-protecting canvas when not being worked on.

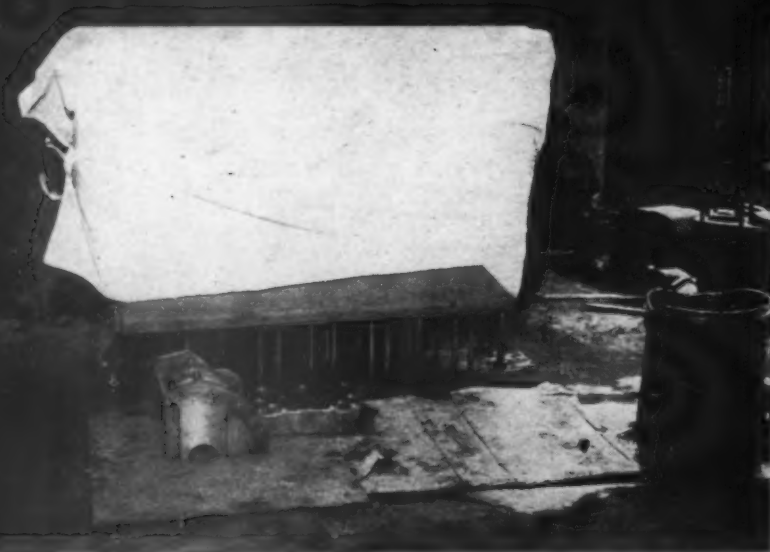
Motor varnish at present is removed with hand brushes, dipped in solution, but a big double soaking vat was being set up.

Notes on Typical Overhauls

On the shop floor the day these notes were taken were a Link-Belt 2½-yd. shovel, Northwest Model 3, Bucyrus-Erie ¾-yd., Marion 1½-yd. (Type 361); also a Galion grader, a Buffalo-Springfield 10-ton roller, Continental wagon, two D7 Caterpillars and a Ransome paver.

The Link-Belt shovel lay partly dismantled, having been held up six weeks for parts. Several badly worn idler and drive sprocket stub axles under this machine were built up by welding and sent out for machinery. Only the worst worn axles were factory replaced.

The Marion shovel had seen rough work and required a good deal of fixing. The lower frame had been drawn out from under the blocked-up turntable and turned over on the floor, where corner cracks in the main casting were welded. Axle shafts on this unit, too, required welding and machining in an outside shop. The circular turntable roller castings were cracked and required several welds. The track pads, which were badly worn, and ordinarily would have been

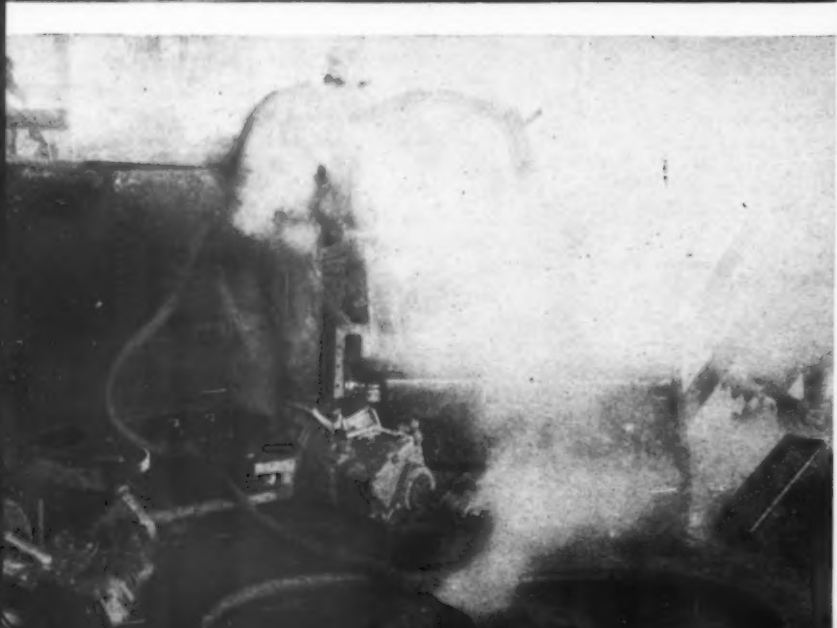


(Upper): How motors undergoing overhaul are protected against dust by canvas hoods

(Below): Even the strongest shovel boom often becomes slightly loosened under the terrific pace of work at Army bases last year. This boom, just to be on the safe side, was completely re-riveted to meet specifications for overseas duty

(Right): The three axles with the newly-machined look just came back from a commercial machine shop after being built up by the Winkelman welder

(Bottom): A wholesale steam-cleaning operation is conducted in one corner of the shop. Steam is generated by a portable oil-fired high-pressure steam making outfit



(Upper): How new bearing plate was welded to frame of D7 Caterpillar—one of hundreds of ordinary repair jobs. The Winkelman crew must handle in large volume

(Lower) Welding a worn stub axle for a Link Belt shovel. Fleetweld No. 7 rod was used, sometimes two or three layers being required to restore worn axles to original dimensions. Every effort is made to bring parts back to standard dimension, rather than to over-size or undersize



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junked, were fitted with new pins and the worn roller paths welded up to make them do. Welding of pads, incidentally, required some experimentation with various weights of rods, since use of too large a rod tended to burn through the metal. Several drum castings were cracked and required brazing. A major job on this overhaul, or indeed on all shovel work, was that of installing new brushings throughout.

The Northwest shovel, also delayed several weeks on parts, had come in with a loose, rattly boom which required new tight rivets all around.

Good Practical Men

The Winkelman shop crew for the most part comprises men who "grew up" on construction machinery. Some of the men have been with him a long time. Others came here from army base field shops. One man came from a tractor distributor; several, including the welder, began as operators, helpers or truck drivers and developed into mechanics. Three men on motors came from commercial garages. All



The D. W. Winkelman Co. doesn't like to be in the spare-parts business any more than any other contractor. Under wartime regulations, parts can be ordered in advance only in anticipation of specific needs for machines to be overhauled. This shows the modern

are good practical men who have proved they know their stuff, and the kind of fellows who will someday again keep machines rolling on big post-war construction jobs—beginning soon, they hope!

Ropes showing excessive flattening or crushing. Cause: overloading or poor spooling.

Whipping of line. Cause: jerking or running with too loose a line.

When Wire Rope Gives Trouble Look for These Causes

CAREFUL attention to your wire rope, always a mark of thrifty job management, continues to be especially important these days. We are indebted to the little booklet, "How to Keep Your Wire Rope Working" published by American Chain and Cable Co., Inc., Bridgeport, Conn. for the following list of common sources of rope failures and their causes.

Lines broken square-off. Cause: overstrain, kink, damage or localized wear weakening one or more strands, and loss of elasticity.

One or more strands parting. Cause: overstrain, or local wear. If overstrain is sudden it will cause a square-off break. In some cases it will show a necked-down condition of wires.

Undue corrosion. Cause: lack of proper lubrication, exposure to salt or alkaline water. Idle periods.

Ropes damaged by careless hauling to location. Cause: rolling reel over obstructions or dropping from truck or wagon onto any hard material. Results in distorting or damaging rope. The use of chains for lashing or use of lever against rope.

Rope damaged by improper socketing. Cause: improper seizing of a non-preformed rope that allows slack from one or more strands to work back into rope, or poor workmanship in socketing. Frequently shown by

being untwisted at socket, loose or drawn.

Ropes showing kinks, dog legs, and other distorted places. Cause: the result of improper handling, installation or operative abuse.

Ropes showing excessive wear in spots. Cause: kinks or bends in ropes due to improper handling during installation or service.

Spliced lines. A splice is not as good as a continuous piece of rope. Slack may work back and cause irregular wear in the splice itself.

Ropes damaged by irregular or improper winding on drums. Cause: excessive fleet angle or lack of attention when rope is installed, resulting in putting bends into rope.

Unequal pressure and distortion of wires and rope. Cause: damage due to scraping of rope over sharp surface or because of improperly fitted clamps or clips.

Side wear on rope. Cause: ropes operated over damaged sheaves or drums or improperly aligned equipment.

Fatigue breaks in wire. Cause: severe bending. Possibly due to excessive vibration, due to poor operating conditions, i.e., high speed, rope whipping, etc.

Spiraling or curling. Cause: allowing rope to drag or rub over any object during installation or operation.

"WELDING OF 11 TO 14% MANGANESE STEELS" is the name of an 18-page booklet published by Stulz-Sickles Co., 134-142 Lafayette Street, Newark, N. J., makers of "Manganal." It includes illustrated chapters on the properties of manganese steel, welding procedure, use of hard-surfacing electrodes, parts serviced with manganese rod, repairing shovel teeth, jaw crusher plates, tractor grousers and other parts. Available free on request.

One of the innumerable examples of welding work in the Winkelman shop—a cracked bolt flange repaired on the turntable roller casting of a Marion shovel



Two Enemies of Your Electric Motors:

Stray oil and moisture, and how to protect motors against them

CONTRACTORS and highway and street department officials depend in innumerable ways on electric motors, large and small, especially motors built into power tools and portable units. Aside from the fact that replacement motors are often practically unobtainable right now, it pays in efficiency and avoidance of breakdowns to baby electric motors with loving care.

Allis-Chalmers Mfg. Co.'s excellent booklet, "A Guide to Wartime Care of Electric Motors" (which is incidentally obtained free on request to this firm's headquarters at Milwaukee), is the source of the following useful advice:

Combating Stray Oil

Because it fights friction, oil is often called the "lifeblood" of motors. And inside bearings, that's exactly what it is. But outside bearings, oil is strictly poison to electric motors.

Dust, another motor enemy, soaks up stray oil, but this trouble-making teamwork operates the other way, too. Sticky oil catches dust . . . just as flypaper catches flies.

When both oil and dirt cover a commutator, good commutation is impossible to obtain. The faces of brushes become glazed and packed with dirt. Harmful sparking is sure to result.

Oil also harms commutators by deteriorating the mica insulating segments between bars.

To insulation on windings, oil is even more harmful. Once a winding is thoroughly oil-soaked, the motor is in immediate danger of a burn-out or breakdown. The soaked winding will probably have to be rewound.

Flour plus water equals dough; dust plus oil equals scum.

Oil is quick to attack insulation. Don't let it reach it.

A motor with dry insulation handles your voltage easily . . . the same voltage may be too much if insulation is moisture-soaked.

Two ways to dry a damp motor: Use heat (portable heater, oven or resistance in motor's coils). Or a breeze (fan or two, preferably combined with heater).

But oil is most dangerous to a motor when it has had a chance to unite with dust in the windings . . . to produce a greasy, gummy mess. The ventilation is smothered; windings are under continuous attack from oil; any metallic dust present is



Keep protective canvas handy! This advice is especially important for motors used on construction. This canvas-covered motor is part of the car unloading apparatus of a bulk cement plant.

caught and held in this "gum"—a constant threat of shorting or grounding.

How to Fight It . . .

When oil and dust have been allowed to build up, the heavy mess should be removed with the aid of a solvent—preferably a non-inflammable one, such as carbon tetrachloride. If brushes or scrapers are used, be careful not to scrape the insulation!

Use solvents with caution, too, taking care not to soak the insulation—on which the solvent is apt to have a softening effect. When all the oil and

dirt are out, dry the windings and apply insulating varnish.

In the repair shop it may be impossible to keep a certain amount of oil from reaching a motor in the form of a mist. (But that which lands on the outside should be wiped off before it can travel inside!)

On the other hand, much can be accomplished in fighting stray oil by keeping a motor's own lubricating oil where it belongs!

For example, never lubricate sleeve bearings equipped with oil rings when the motor is running. The oil level then does not indicate full supply. A certain amount of oil is riding the ring above the level . . . and overflowing and escape of oil are apt to result.

And check oil seals, well covers and plugs at regular intervals to see that they are tight. Once outside a bearing, oil means trouble!

Protecting Against Moisture

Heaven for a motor most certainly would be a dry place. And while it is impractical to keep motors completely dry in many installations, that nevertheless should be one general aim of effective maintenance.

Failing in that, the second aim should be to get rid of moisture lodged in a motor as quickly as possible—for two reasons.

First, it takes time for moisture to soak and soften insulation. Often, it is possible to get it out before the damage is done.

Second, evaporated moisture is pure water when it first condenses in a motor. It is then at its least dangerous stage. But every extra hour water stays in a motor gives it just that much more time to absorb harmful compounds and become an active, destructive agent.

How to Fight Moisture

Every effort should be made to keep water in liquid form from dripping on, splashing on, or flooding a motor . . . unless, of course, the motor is of splash-proof design.

Whether air-borne moisture has produced a harmful condition in the motor can be determined by testing insulation resistance with a megger. When resistance has dropped to a dangerous point, the motor should be dried out by one of these methods:

1. Where an oven is available, this is the best method of drying.
2. Circulate current through the windings to produce heat inside the

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insulation—driving moisture outward. Lock the armature to prevent rotation and use a rheostat to apply low-voltage current.

3. Use a fan to force air through hot elements (resistors, steam pipes, etc.) and into windings.

4. Enclose the motor with non-inflammable materials and convey heat to it through ducts.

5. Cover the motor with a tarpaulin—leaving openings at top and bottom for air circulation—and provide heat with one or more electric light bulbs.

Whatever method is used, care should be taken that the drying is accomplished without damage to the insulation. Better interrupt the baking for a megger test than bake insulation to the point of brittleness or burning. (The baking temperature should not greatly exceed the boiling point of water.) When dry, renew your motor's resistance to moisture by applying a good grade of insulating varnish.

In a production war like this one, keeping motors dry is as essential as keeping powder dry!

Timely Hints on Motor Care

From the Buda Company, Harvey, Ill., as published in their manual 739-e on care and operation of Buda "Hivelo" Engines: Time spent on the inspection and care of the engine will be many times repaid in long life and trouble free operation.

Care Daily

1. Check the oil level on the bayonet gauge and add more to the supply if necessary.

2. Fill radiator preferably with soft water free from lime.

3. Make sure ignition wires and terminals are tight.

Care Every 500 Miles (or 20 Hours Operation)

1. Lubricate water pump bushing.

2. If magneto, starter and generator are used, give bearings a few drops of oil (3 in 1).

3. Lubricate fan bearings. The fan-hub is provided with a pipe plug or the pressure lubricating fitting. Oil weekly using chassis lubricant.

4. Tighten fan belt if loose, but always bear in mind that "V" type belt must run with some slack.

5. Clean carburetor gasoline strainer each week for the first month.

6. Tighten all loose nuts, bolts and cap screws.

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ROADS AND STREETS, March, 1944

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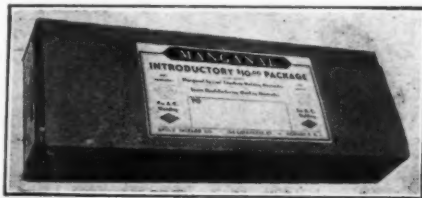
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Care Every 2,000 Miles (or 60 Hours Operation)

1. Check valve tappet clearance and re-set when necessary.
2. Drain oil and flush out oil pan. Do not use kerosene for rinsing; use one gallon of cheap light oil, or regular flushing fluids which can be purchased at oil stations. Drain this rinsing oil, and refill with fresh oil to the proper level. Do not rinse with kerosene. If a filter is used, clean and flush out the filter housing, renewing the element if the oil loses its amber color and becomes streaked with black.
3. Remove oil screen and clean it.
4. Clean carburetor gasoline strainer.

5. Check spark plug points, and, if necessary, reset to approximately .025".

6. Check water level in storage battery where same is used or have it serviced regularly by a responsible battery service station.

7. Check distributor or magneto interrupter points. They should be free from pitting and signs of burning and gaps should be not less than .015 nor more than .025. If points look burned or ignition seems faulty, we recommend you consult ignition expert.

Where serious failures, such as: broken crankshaft, broken case or cylinder block or where engine needs a general overhauling or rebuilding, consult the manufacturer from whom your engine was obtained.

Clam Buckets: Their Care in Wartime

Clamshell buckets of course cannot always be readily replaced these days. Realizing the special importance of keeping every available bucket in tip-top working condition, The Hayward Company, 50 Church St., New York, N. Y., has issued the following timely suggestions which we are reproducing with permission. While they apply specially to Hayward buckets, these reminders are of interest to all bucket owners.

Keep your bucket constantly and correctly lubricated no matter what kind of material it is handling.

Use new oil—not crank case drainings, and good grades of grease.

Swab the closing chains in Class "E" buckets with medium grade auto engine oil, use a good brush and an open can, brushing the oil into the joints between the links edgewise so that the oil will have a good chance to reach the chain rivets.

Likewise swab the wire rope closing line.

Use oil on such joints in the bucket as do not have grease fittings.

Pump liberal quantities of grease into the power wheel hubs, the idler sheave pin, the blade arm bearings and the connecting rods—enough to push out the old grease and grit.

If the greaseways become clogged, clean them out even if you have to take things apart to do it. It is well worth while.

Hayward's rope reeved clamshell buckets all have separate grease holes running to each sheave bearing. Don't substitute sheave pins made with a common grease hole—it won't work.

Remember—it is dangerous to let wear develop beyond the point of replacement.

All buckets (Hayward) built in recent years and intended for general service have manganese steel bushings and hardened steel pins except in sheaves which are bronze bushed.

Watch these bushings and replace them before they are completely worn.

If you have a bucket which is bronze bushed and which handles gritty material, see manufacturer about changing it to manganese steel.

Don't let side chains get "out of step" by uneven lengths caused by the use of ordinary steel links or pins in making repairs. Such unevenness will rapidly destroy the chain.

(The Hayward Company rebuilds partially wornout chains when they are sent to its shop.)

Finally, don't let any part of the main structure wear so much as to weaken the whole bucket. That will cause a costly replacement job and loss of bucket's efficiency.

RBC
ROLLER BEARINGS
take the shock load—and like it in
GALION MOTOR GRADERS

Not merely rotation and oscillation but a heavy shock load is placed upon RBC Roller Bearings used in the tandem drive of Galion 101 and 201 Motor Graders. This all-gear driven tandem drive, with RBC Bearings operating in an oil bath, provides full flexibility under all working conditions.

ROLLER BEARING CO. of AMERICA
TRENTON . . . NEW JERSEY

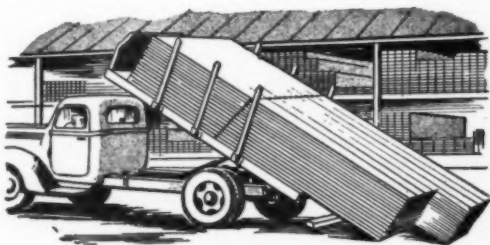
A booster hoist under ANY TYPE
OF BODY spells **SAVINGS**

Lay that LUMBER down!

Have you ever unloaded lumber, stick by stick, carrying it back and stacking it in even piles? It's a splintery, time-consuming job.

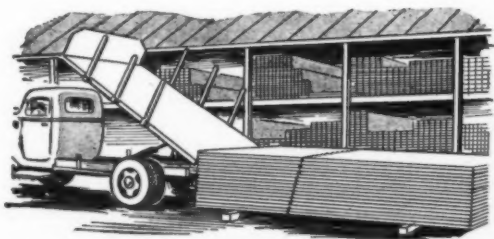
Central Lumber Co. of Wisconsin lays the load down all at once with St. Paul Booster Hoists at six of its yards.

Here's how:



1 Hoist is raised until ends of boards touch the ground. Skid is placed on ground under load.

2 Truck drives forward. Another skid is placed under load.



3 Truck drives away. Load is laid down on skids. No handling!

Please write us giving particulars of the essential work you'd like to use our Booster Hoist for.

Your stake or platform body can be converted.

BUY AN EXTRA BOND!

ST. PAUL HYDRAULIC HOIST COMPANY
2207 University Avenue, S. E.
MINNEAPOLIS 14 MINNESOTA

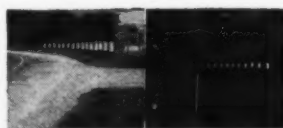


Keep Your Signs
Wide Awake

in the "BLACK" of NIGHT!

Identical night and day appearance is an outstanding safety feature you get from a "SCOTCHLITE" sign. "SCOTCHLITE'S" flexibility and low cost permit complete background reflectorizing—increasing the attention value and making the sign more easily read.

"SCOTCHLITE" is available in white, yellow, silver and red—standard colors for all types of signs, markers and barricades. Installation is easy and inexpensive—no skilled help or special equipment is necessary. "SCOTCHLITE" comes in roll or sheet form.



GUARD RAIL AND BARRICADE MARKERS



SPEED AND TRAFFIC SIGNS



DIRECTIONAL SIGNS AND MARKERS

"SCOTCHLITE" signs for test purposes can be supplied at reasonable cost. Write today for further information.

"SCOTCHLITE" is the trade-mark for Reflex Reflector Sheeting made in U.S.A. by

**MINNESOTA
MINING AND
MANUFACTURING CO.**

SAINT PAUL 6, MINNESOTA

Branches in Principal Cities



Gentlemen:

Kindly send further information on your sample sign offer.

Name

Address

City Zone State

R&S 344

REMEMBER THE MAINE..



POTATO CROP OF 1943

You can safely bet your family's ration books that Maine farmers will remember it with pride—and for many years to come! Fighting food . . . spuds by the millions of barrels! A Victory crop so enormous that unprecedented measures had to be taken to harvest it and keep it secure against Winter. And mister, **THAT'S WHERE GENERAL EXCAVATOR SHOVELS ENTERED THE PICTURE IN A BIG WAY.**

General power shovels helped to revive the old method of pit storage (huge pits dug in the earth) in order to save the crop. This was necessary because there were millions of bushels yet to store after every available foot of inside storage space was taken. The crop was saved . . . another vital Victory job completed! We hope as Maine goes, so will go the rations!



For post-Victory performance—side with General and Osgood! Their post-war values are revealed by their war service—today!

The
OSGOOD
COMPANY
Sizes: $\frac{1}{2}$ to 2 $\frac{1}{2}$ Cu. Yd.
Diesel - Oil - Gas - Electric
Associated with
The GENERAL
EXCAVATOR CO.

The
HERCULES
COMPANY
HERCULES
"IRONROLLERS"
6 to 12 Tons
Diesel or Gasoline
Associated with
The GENERAL
EXCAVATOR CO.

GENERAL

Sizes:
 $\frac{3}{8}$ - $\frac{1}{2}$ - $\frac{5}{8}$ - $\frac{3}{4}$ Cu. Yd.
Diesel - Gas - Electric

SHOVELS
DRAGLINES - CRANES
Crawler & Wheel Mounted

THE GENERAL EXCAVATOR COMPANY, Marion, Ohio

ERIE

THE COMPLETE LINE

BUCKETS

Hundreds of Erie Buckets are being shipped monthly for war uses. Straight line bucket production experi-



ence means better buckets for post-war and fast delivery. Investigate the complete Erie line now.

ERIE STEEL CONSTRUCTION CO. • ERIE, PA.
Aggregators • Buckets • Concrete Plants • Traveling Cranes

(Continued from page 76)

mission. It has received \$3,300,000 to date to defray expenses for plans and specifications on state projects and to lend or grant to municipalities for similar use.

Municipal Post-War Projects: During 1943 some 1,628 towns and cities submitted projects, which were reviewed by the state controller as to cost-vs.-worth, etc., then considered for approval in the light of the willingness of the locality to finance the project entirely if necessary.

Up to 4% of the estimated cost is lent or granted for advance engineering, which may be delegated to consulting firms and has been in many instances. The state sometimes shares in the cost where elaborate test borings, extended surveys or other unusual engineering expense is necessary to move a project along.

To Jan. 1, 3,407 applications for \$327,000,000 in municipal projects were submitted, and 1,149 involving \$74,000,000 approved. This was in addition to 545 projects totaling over \$100,000,000 already made ready, in which no design grants were needed.

State Highway Projects: The state projects submitted in 1943 included throughways, grade separations and bridges, and extensions or betterments of the state highway and the parkway systems. These have been coordinated into a broad 5-year program to cost a probable \$779,000,000, with over \$400,000,000 for highways. Work is to be financed by the state, anticipating the present F.A. ratio. The New York legislature is expected to pass a pending bill for right-of-way, and \$140,000,000 of this job is expected to be in ready blueprint form for construction in the first post-war year.

Feature of New York State's post-war effort is a remarkable thru-way system, embodying over 480 miles of no-stoplight, limited access roadways and constituting the most ambitious highway project ever attempted by a state. It will be toll-free. The standards call for six lanes divided, with 200 ft. minimum right-of-way, maximum utilization of waste land in location, by-passing of all cities, modern acceleration and deceleration lanes, 70 mph speeds, 1,000 ft. min. sight distances.

The Nevada state department of highways has budgeted \$900,000 for maintenance during 1944. The state's arterial roads are in generally good condition, according to Robert A. Allen, state highway engineer, due to a policy of rebuilding about 150 miles of the worst sections annually in the pre-war years.

B. F. AFFLECK DIES; Concrete Road Pioneer

Benjamin F. Affleck, good roads pioneer and retired president of Universal-Atlas Cement Company, died Feb. 13 in Winnetka, Ill., age 74. He was an early booster of the once-novel idea that good motor roads might be built with concrete, having fought for this idea back in the days when Wayne County, Mich., had just completed its first concrete rural road (1909) and even cement makers were among the skeptics.



B. F. Affleck

Born in Belleville, Ill., Mr. Affleck had a varied early experience, including work in a machine shop and as a railroad clerk. In 1896 he began as a stenographer with the Illinois Steel Company, now Carnegie-Illinois Steel Corp., becoming cement department branch manager and in 1906 general sales manager of the Universal Cement when formed as a subsidiary.

In 1915 Mr. Affleck became president of Universal, continuing to head the merged Universal-Atlas company until his retirement in 1936. He was a director until his death. He was president of the Portland Cement Association from 1916 to 1920, and a leader in Association affairs throughout.

Called by many the father of concrete roads, Mr. Affleck early saw the importance of quality workmanship, and he was one of the first to put inspectors on road jobs at the manufacturer's expense. He led the national conference of concrete roads in 1914 and contributed vision and leadership in the advancement of the good roads idea. Mr. Affleck was on hand to greet his many friends at the recent A.R.B.A. and other highway meetings in recent weeks and remained active in Chicago civic affairs to the last.

Cost of Mud-Jacking in Illinois

According to the 25th annual report of the Illinois Division of Highways, ten mud-jacking units during 1942 raised pavement settlements due to subgrade failure at 3,882 locations. The work involved a total of 209,874 sq. yd. of pavement. The direct cost of these operations was \$61,265, or an average of 29c per sq. yd. This cost does not include equipment depreciation and overhead charges.

STOODY SELF-HARDENING HALTS SPOT WEAR!

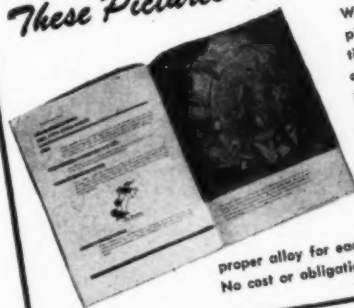


Buckets and dipper fronts invariably wear unevenly, areas receiving greatest abrasion naturally being first to give way. Many shovel users make it a practice to patch worn spots by welding in sections of manganese or high carbon steel plate, thus restoring original wall thickness. This procedure is effective, but strictly temporary because manganese plate offers no greater wear resistance than the surrounding metal and will wear away just as rapidly as the original base steel.

Stooddy Self-Hardening provides the extra wear resistance needed for fast wearing spots...

Not only is it much harder and more wear resistant than ordinary steel, but it is also tough and will stand severe impact. The way to get maximum shovel efficiency and avoid frequent delay for routine repairs is to hard-face areas where wear is concentrated. Thereafter the abrasion normally causing greatest damage is received by the hard metal and wear is evenly distributed over the entire bucket surface.

These Pictures Tell the Story!



Write for Stooddy's pictorial "Specification Sheets." Shows closeups of Stooddy Hard-Facing applications on many types of heavy equipment. Tells in few words recommended hard-facing procedures and proper alloy for each type of application. No cost or obligation. Write today!

Stooddy Self-Hardening is very easy to apply and forms a strong bond with manganese steel. It is available both in coated and bare rods for D.C. Electric application and can be purchased through Stooddy distributors located in all major cities. 3/16" and 1/4" diameter rods are priced at only \$.50 per lb., F.O.B. Whittier, Calif., or distributor's warehouses.

STOODY COMPANY, 1125 W. SLAUSON AVE., WHITTIER, CALIFORNIA

STOODY HARD-FACING ALLOYS
Retard wear... Save Repair

New Equipment and Materials

Road Cleaning Magnet

Cutler-Hammer, Inc., Milwaukee, Wis., has developed a scrap magnet pick-up outfit especially designed for cleaning roads and airport runways, as shown in the accompanying illustration. Three magnets are usually mounted in one unit—two ahead of the rear wheels and one behind. A road span of 8 to 9 ft. is covered. Magnets are carried 2 to 3 in. off the



Scrap pick-up magnet

Twenty-two REASONS Why FLEX-PLANE Dummy Joints are Necessary in Modern Concrete Pavements

- Reduces the Number of Expansion Joints
- More Dummy Joints Divide Contraction Openings
- Prevents Cracking
- Retards Creeping
- Controls Warping
- Reduces Curling
- Relieves Stress
- Lessens Bumps
- Minimizes Pumping
- Minimizes Panning
- Lessens Deterioration
- Lowest Cost
- Limits Maintenance Cost
- Anchored in Place — Is Permanent
- No Extrusion
- Localizes Expansion and Contraction
- Assists in Normalizing the Slabs
- Ribbon Joint is Continuous in Length
- Prevents Infiltration of Water
- Increases Strength of Slabs
- Produces Homogenous Structure
- Provides Expansion Relief for the Hot Upper Part of the Slab



FLEX-PLANE joint installing machines eliminate messy hand methods. Install all types of joints . . . ribbon, poured, pre-moulded, etc., with or without VIBRATION.

• Ask for Equipment Specifications •

FLEXIBLE ROAD JOINT MACHINE CO. WARREN, OHIO U. S. A.

ROADS AND STREETS, March, 1944

ground for best results. Four mounting plates on each magnet permit bolting magnets to brackets or suspending them by chains or cables. Power is from an ordinary engine-driven generator (an ordinary farm generator plant works well) on the truck. The controller consists of a two-pole switch with one discharge contact, the necessary discharge resistor and a separately mounted pushbutton. Voltage, 115 or 230. Weight of outfit about 1,000 lb.

New High Frequency Motor Generator

A new line of high frequency motor generators has been announced by the Kato Engineering Co., Mankato, Minn. This machine is a motor and a generator with frames cast integral. The cores of the motor and generator are two distinct armatures but are mounted on one common shaft. A great many combinations of A.C. voltages and frequencies can be had in this unit such as either 400 or 800 cycles.



Kato high frequency generator

Also motor winding may be tapped to deliver 60 or 120 cycles at either 1800 or 3600 r.p.m. Voltages from 60 volts on the tapped winding to 250 on the 800 cycle winding. Capacities up to 1000 watts may be furnished. Motor can be wound for D.C. voltages 110 or 220 volts D.C. input. This can also be furnished at three phase at slightly lower capacities. Voltage regulation is approximately 6% at 120 cycles and 24% at 720 cycles. Frequency regulation is 1.6% at 1000 volt-amperes. This unit is approximately 16 1/2 in. long; 8 3/4 in. wide; 13 1/4 in. high and weighs approximately 110-lb. net.

New Combination Compressor Generator

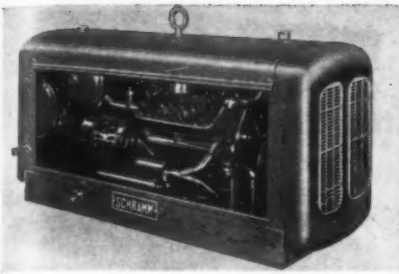
A new model combination compressor generator has been added to the line of Schramm, Inc., West Chester, Pa. This unit is a compact source of compressed air and electric current arranged for location under a work bench in a portable machine shop,

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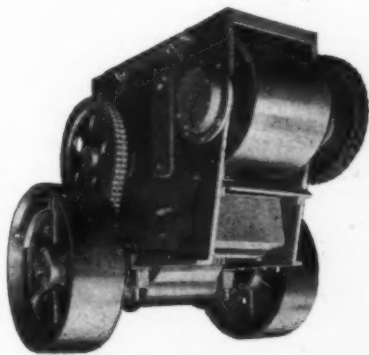


Model 60 Fordair Compressor with 5KW Single Phase Generator.

either truck, trailer or railway car. It will produce 60 cu. ft. of compressed air at 100 lb. gauge pressure; or 5 KW of single phase alternating current at 120 volts; or simultaneously compressed air and electric current to the extent of the engine horsepower. The Schramm safety vacuum control limits the supply of air compressed when an electric load is being carried. The generator is a 5 KW, single phase, 60 cycle, 120 volt alternating current generator with built-in exciter, direct driven from flywheel of Model 60 Fordair compressor. The compressor is a standard model 60 Fordair mounted on welded steel frame with electric starter, voltage controlled type battery charging generator and gasoline pump.

New Dual-Action Crusher

A new crusher that combines the jaw and roll features into one machine and gives primary and secondary crushing in one operation has been brought out by the Diamond Iron Works, Inc., Minneapolis, Minn. The unit weighs but a little more than half the combined weights of a conventional jaw and roll, and it saves an even greater proportionate space.



Diamond Dual-Action Crusher

Less conveying equipment is required, and it is claimed that there is also a large saving in power consumed. Also, greater uniformity of product is claimed. The interesting details of design are described in the manufacturer's Equipment Bulletin D-44-M.

New Brake Lining for External Brakes

Improved moulded brake lining with wire back reinforcement for use with external (band or contracting type) Brakes has been announced by the Gatke Corporation, 228 N. La Salle St., Chicago 1. Known as Gatke external dura-blok brake lining, this latest Gatke development is being used on many applications to replace woven brake lining which is critically scarce due to war production requirements for prodigious quantities of woven asbestos materials. Rolls of Gatke external dura-blok are fur-



New Brake Lining

nished in a complete range of sizes up to $\frac{3}{4}$ in. thick by 6 in. wide.

LIMITED NUMBER OF HERCULES TEN GAUGE BODIES PRE-WAR DESIGN and CONSTRUCTION NOW RELEASED

For IMMEDIATE SALE and DELIVERY!

WIRE OR WRITE US AT ONCE
REGARDING YOUR REQUIREMENTS
and refer to this advertisement

Hercules Steel Products Co.

GALION, OHIO

CORONACH

*"Of these immortal dead who
live again
In minds made better by their
presence."*

CLARENCE M. BROOKS of Littleton, N. H., a former division engineer of the New Hampshire State Highway Department, died Feb. 25 in Kissimmee, Fla. He had been connected

with the department for many years, first as a division engineer at Keene, N. H., and later at Littleton.

E. B. DONAHUE, formerly chief engineer for the State Water Conservation board of Montana and later state engineer, died last month in a hospital in New York City where he had undergone an operation. For the last 18 months he had been manager for a construction company on a government project in Nassau, Bahamas.

Mr. Donohue was district highway engineer at Butte, Mont., from about 1930 to 1937 when he left to take a position with the state highway de-

partment at Helena. In 1938, Mr. Donohue, then chief engineer for the State Water Conservation board, was also named state engineer through a consolidation of the two offices. He was 48.

ERNEST G. EDDY, City Engineer of Lansing, Mich., died Feb. 13. He was 71 years old and had been in the employ of the city for 33 years.

JOHN T. FANNING, an engineer who helped design several of Chicago's bridges, freight tunnel, pumping stations and sewers died Feb. 23, aged 75. He was last associated with the general contracting firm of John C. Tully & Co., Chicago.

BEN H. FLYNN, inventor, contractor, and manufacturer, died Feb. 22, at Alexandria, La., aged 54. Mr. Flynn was for many years active in construction work, chiefly concrete paving, in Oklahoma, Texas, and Louisiana. Since 1932 he has been manufacturing the "Flynn Surgrader" and later developed the "Flynn Road-builder." Both machines were invented by Mr. Flynn and are now nationally known.

CONRAD G. FREDIN, for the past 10 years an engineer in the St. Louis County (Minn.) county surveyor's office, died suddenly last month in Duluth. He was formerly a road contractor.

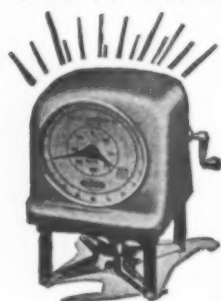
WILLIAM J. FULLER, Professor of civil and structural engineering in the Extension School of the University of Wisconsin, died Feb. 25, at the age of 61. He was graduated in 1906 from the University of South Dakota. He joined the Extension Department of the University of Wisconsin at Madison in 1911, and nine years later went to China on leave to become instructor in the Nan Yang College, a Government school at Shanghai. He returned to the United States in 1922 and came to Milwaukee, Wis., to become Professor of Engineering. He also was chairman of the Extension School's engineering department.

ELTON DAVID WALKER, Professor emeritus of civil engineering at Pennsylvania State College, died Feb. 24 at State College, Pa., after a heart attack. He was 74. Mr. Walker had been affiliated with the college since 1900, serving as head of the department of civil engineering from 1907 until his retirement in 1939. Before joining the Penn State faculty he taught engineering at M. I. T. and Union College. He was graduated from Massachusetts Institute of Technology in 1890 as a B.S. in civil engineering.

2 Airport PAVING JOBS COMPLETED IN 1943— Another Started



With This H & B PORTABLE



The
FLUIDOMETER
AUTOMATIC METERING
SYSTEM

Saves time, materials—insures uniformity. For all types of plants.

Asphalt Plant

The portable asphalt plant shown above—one of four H & B plants owned by Allegheny Asphalt Paving Company of Pittsburgh—completed two airport jobs in 1943, and started on another. Total asphalt production on the two jobs was 87,600 tons, with an all-time average of 96 tons per hour, and the high production 132 tons per hour. The Allegheny Company's other portable plant—a smaller unit used as an auxiliary plant—completed one airport job in 1943 and started on another. Allegheny Company officials attribute these production records to the efficiency of the double driers, which permitted continuous operation. For many weeks the plants operated a total of 20 hours per day. Literature on H & B portable and stationary asphalt plants will be sent on request.

HETHERINGTON & BERNER Inc.
INDIANAPOLIS 7, INDIANA

Hetherington & Berner

With the Manufacturers

LeTourneau to Have Own Distributors

Plans have been perfected for a major change in the sales policy of R. G. LeTourneau, Inc. This provides for exclusive representation of the LeTourneau line of heavy earth-moving equipment by its own distributors instead of through Caterpillar Tractor Co. distributors, as heretofore. All Caterpillar and LeTourneau dealers in the United States and Canada have been notified of this change in sales policy. It is pointed out that the change will be gradual, probably requiring several months before the new policy is in complete operation.



E. R. Galvin, general sales manager, reading the announcement of the change of Sales Policy to Harry L. Vines (also seated), western sales manager, Stockton, Calif., and (standing, left to right) Paul Fulford, export sales manager; Howard L. Stilley, central sales manager, and H. R. Conn, eastern sales manager

In the meantime LeTourneau is making adjustments and additions to its sales staff for the new distributor program. Howard L. Stilley, after a brief period as chief field engineer, has been appointed central sales manager. John F. Johannsen, long export general manager, has also been named export assistant general sales manager, to advise on export sales. Robert D. Evans, formerly assistant, has succeeded Mr. Stilley as chief field engineer. Bruce Royer, heretofore with the U. S. Engineers, Chicago offices, on March 8 became Mr. Evans' assistant.

Adjustments in the LeTourneau district representatives' staff are likewise in the making. Veteran "DR's" assisting in the new distributor program include: Louis D. LeTourneau of Portland, Ore.; M. E. Miller of Atlanta, Ga.; R. E. Pendleton of Denver, Colo.; J. E. Blanch of Utica, N. Y.; B. B. Brown, Minneapolis, Minn.; Paul King, formerly of the LeTourneau export department and now district representative in Los Angeles, and E. M. Ferguson, advanced from

Los Angeles to Stockton to be assistant western manager. Already added to the district representatives' staff, with assignments forthcoming soon, are John Ralls, long widely known in the Memphis, Tenn., construction area, and C. W. Scholvin, another construction veteran, who has been with WPB in Washington, D. C.

Roy A. Fruehauf Made Executive Vice President

Roy A. Fruehauf has been appointed executive vice president of the Fruehauf Trailer Co. For more than two years, throughout the war period, he has supervised the company's heavy war production program as well as many other phases of its activities. Roy Fruehauf has literally grown up with the business. Upon completion of his schooling, he went to work in the factory and moved from there into engineering. Later, with a background of manufacturing

Power Graders drive BUCKEYE SPREADERS in Colorado!

Right—Grader-powered Spreader applying chips in seal coating operation.



Left — Loading Spreader with chips from truck. Spreader remains hitched to grader.

THE versatility of Buckeye Spreaders is shown again by the ingenious spreading method devised by the Colorado State Highway Department. Spreaders are hitched to power graders and need not be unhitched during the entire spreading operation. When the spreader has emptied, the grader backs up enough to permit a truck to back in over previously laid chips instead of over freshly applied oil, to reload the box. Delay and truck time are minimized.

Buckeye Spreaders, according to signed reports from users, are capable of spreading chips, sand, stone, etc., to accuracies as high as 98 to 99%. Boxes available in 9, 10, 11, and 12 foot widths. Complete data and specifications in *Bulletin available on request. BUCKEYE TRACTION DITCHER COMPANY, Findlay, Ohio, Earth Moving and Road Building Machinery for Over 50 Years!*

See your Buckeye Spreader dealer.

LOOK AHEAD

Records show that 75% of unemployment during the depression came from the durable goods industries. Construction is an important part of this. The \$3,000,000,000 postwar road program recommended by the American

Road Builders Association will meet the nation's highway transportation needs, put war-neglected roads back in shape and provide sufficient employment to help maintain economic balance. Are you behind this plan?

Power, Finegraders
Tractor Equipment
Trenchers

Buckeye✓

Convertible Shovels
Road Wideners
Spreaders

ROADS AND STREETS, March, 1944

experience, he took up active selling in Chicago branch territory. From then until 1941 he devoted his entire time and attention to sales development, being closely identified with the opening of many new territories. Since then he has been concerned chiefly with constantly expanding production—made necessary by the growing importance and acceptance of the truck-trailer as a vital transport vehicle. Fruehauf manufacturing facilities now include plants in Detroit, Los Angeles, Kansas City, Omaha, Springfield, Mo., Cedar Rapids, Ft. Wayne, Birmingham, Ala., and Toronto, Canada.

Philpott Appointed Distributor for Worthington

A. J. Philpott Co., 1419 17th St., Denver, Colo., and 118 Motor Way, Salt Lake City, Utah, has been appointed distributor for the Rocky Mountain region for Worthington Pump & Machinery Corp., Harrison, N. J., and will handle its line of rock drills, paving breakers, sheeting drivers, trench and clay spaders, wagon drills, portable compressors, semi-portable compressors, heat treating furnaces and accessories.

Buchanan Joins LaPlant-Choate

H. H. Buchanan, formerly assistant general sales manager and acting export manager for the Thew Shovel Co., Lorain, O., has been appointed general sales manager of La Plant - Choate Manufacturing Co., Inc., Cedar Rapids, Ia., manufacturers of earthmoving and land clearing equipment for Caterpillar - built



H. H. Buchanan

tractors. He succeeds H. N. Graves, who resigned last June. Mr. Buchanan—or "Buck," as he is more familiarly known by his many friends in the construction equipment industry—began his administrative career as a sales representative for Bucyrus-Erie Co. in 1923. In 1928 he was promoted to district sales manager in charge of the St. Louis office, and three years later was made assistant central sales manager with headquarters in Chicago. In 1936 he joined the Caterpillar Tractor Co. as a special representative, in which capacity he served until 1939, when he became western district sales manager (San Francisco) for the Thew-Lorain. He also served as western sales manager (Kansas City) and Washington, D. C. manager before being advanced to the position he held prior to his appointment with LaPlant-Choate. He assumed his duties with LaPlant-Choate on March 1, 1944.

Magennis Promoted by Goodyear

Frank T. Magennis has been named a vice-president of the Goodyear Tire & Rubber Export Co. Prior to his promotion he was an assistant manager of the export company. Mr. Magennis has more than 25 years' service with Goodyear, practically all with the export company.

Means Promoted by Pittsburgh Plate Glass

Dwight R. Means, who has been associated with the Columbia Chemical Division of the Pittsburgh Plate Glass Co. for 21 years, has been named assistant to the vice-president. After attending the University of Kansas, Mr. Means joined the company as a draftsman. Prior to his new appointment he was technical director and had previously served as research director and assistant superintendent.



Especially Adapted for Wartime Maintenance of Vital Roads and Airports



A copy of this pocket-size BITUVIA Manual will be sent on request

***E**ASE of application, deep penetration and firm binding are among the characteristics that make BITUVIA Road Tar an ideal material for wartime maintenance of vital roads and airports.

Whatever your problem in road or airport construction or maintenance, there is an economical and dependable way of solving it by the use of BITUVIA. An engineer from our nearest office will be glad to call and discuss your road problems.

BITUVIA is available in all grades to meet standard specifications.

REILLY TAR & CHEMICAL CORPORATION

Executive Offices: Merchants Bank Building, Indianapolis, Indiana
 2313 S. DAMEN AVENUE, CHICAGO, ILLINOIS 300 FIFTH AVENUE, NEW YORK, N. Y. ST. LOUIS PARK, MINNEAPOLIS, MINN.
 SEVENTEEN • PLANTS • TO • SERVE • YOU

Well Known Firms Take On Kotal

Kotal Company of New York has announced the appointment of a number of new distributors serving to extend its rapidly growing coverage. Smith Booth Usher Co., well-known West Coast machinery and equipment house, operating from Los Angeles, will handle the business in California, Nevada and Arizona. In the mid-continent, Carter-Waters Corporation of Kansas City, long established highway and building material dealers, will handle Missouri, Kansas, Nebraska, Oklahoma and Southern Iowa. Wasatch Oil Refining Co. of Salt Lake City, Utah, will handle Utah. Drummond & Co., Inc., an affiliate of Arundel Corporation of Baltimore, will handle Maryland, the District of Columbia and Virginia. In the North Central area, Lake Asphalt & Petroleum Corporation will handle Minnesota, Northern Iowa, North Dakota and South Dakota.

DEMA Opens Office in Chicago

The Diesel Engine Manufacturers Association has opened headquarters at One North LaSalle St., Chicago, Ill. Harvey T. Hill, who was recently appointed executive director of the association, is well known throughout the field of business and in organization work. He was graduated from the Engineering School of Pennsylvania State College and later received a master's degree in the School of Commerce at the University of Chicago. The officers of the Diesel Engine Manufacturing Association are: President, Robert E. Friend, President of the Nordberg Manufacturing Co. of Milwaukee; Vice-president, Gordon LeFebvre, President of the Cooper-Bessemer Corporation, Mt. Vernon, Ohio; and Treasurer, Robert H. Morse, Jr., General Sales Manager of Fairbanks, Morse & Co., Chicago.



Harvey T. Hill

Hall Appointed Assistant General Manager

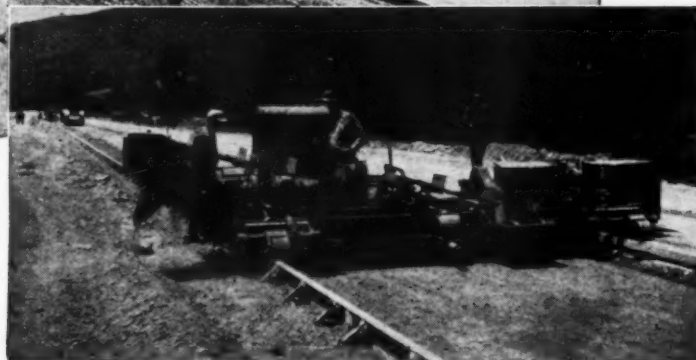
Alton Parker Hall has been appointed assistant general manager of sales of American Chain & Cable Co.,

Inc. He assumed his duties March 1, 1944, with headquarters at 230 Park Ave., New York. Mr. Hall has been with Bethlehem Steel Co. since 1922, having served first in the operating department and in the sales department since 1925. He has been assistant manager of sales of their New York office since March 1, 1938. Born in Kingston, N. Y., he was graduated from the Kent School in 1918 and from Princeton University in 1922. During World War I he served in the Army and subsequently became an officer in the Field Artillery Reserve Corps.

Hale and Jenks New Vice Presidents

T. B. Hale and F. W. Jenks have been elected vice presidents of the International Harvester Co. by its Board of Directors. Hale, former domestic sales manager of the company, becomes vice president of General Line Sales, and in that capacity will supervise the operations of a newly designated General Line Sales Department, which, under the company's new divisional organization, will handle the sales of all products except motor trucks and industrial power

the facts about FINEGRADING are...



THERE is ample evidence based on prewar road building jobs when time and money were uppermost in contractors' minds and on forced draft war jobs where time assumed a new and strategical importance, that Buckeye R-B Power Finegraders should be considered an essential part of every paving outfit. They offer these benefits: ability to cut the grade to accurate cross section, eliminating excessive loss of yield in slabs that are too thick and avoiding penalties due to slabs being too thin; ability to handle a heavy burden permitting faster, less accurate rough grading; speed that has been shown sufficient in some jobs to keep the grade out ahead of two double drum 34-E pavers working in tandem.

It doesn't cost anything to get more facts. Send for descriptive bulletin today.

Buckeye Traction Ditcher Co.
Findlay, Ohio



Buckeye✓

Power Finegraders
Trenchers

Tractor Equipment
Road Wideners

Convertible Shovels
Spreaders

ROADS AND STREETS, March, 1944

equipment. Jenks, former manager of the company's Credit and Collection Department, becomes vice president of merchandising services and as such will have supervision over the Credit and Collection and Consumer Relations Departments. Organization of a new Harvester Motor Truck Division headed by P. V. Moulder as general

manager was announced several weeks ago.

Lilley Promoted by Timken

H. B. Lilley, former assistant chief inspection engineer, has been promoted by the Steel and Tube Division of The Timken Roller Bearing Co.,



Shown is an example of an Indianapolis secondary street improved in 1943 by applying hot tar directly to the old street surface without scarifying or grading. This expedient reduced costs, helped meet labor and equipment shortage and permitted stretching available materials over streets which otherwise wouldn't have received any attention. Inspecting this job are Wm. F. Nixon, Reilly Tar and Chemical Corp.; City Engr. Arthur E. Henry; Wm. J. Grady of Grady Bros. Construction Co.; Street Commr. Luther Tex, and Indianapolis' mayor, Robert H. Tyndall.

to the position of sales development engineer. He will specialize in the application of mechanical tubing to machine tool products and other engineering applications. Mr. Lilley was graduated from Carnegie Institute of Technology as a mechanical engineer in 1924 and has been employed by The Timken Steel and Tube Division in various capacities connected with the inspection of tubular products. In recent years, he has specialized in the development of tubing applications to the aircraft industry.

Fagan New Vice President

Charles C. Fagan, former regional director for Africa, has been named vice-president of The Studebaker Ex-



Charles C. Fagan
Motor Car Co.

port Corporation. Mr. Fagan has most recently been in charge of the company's procurement division offices in Chicago. Prior to his 15-year connection with Studebaker he was for many years with the Pierce-Arrow

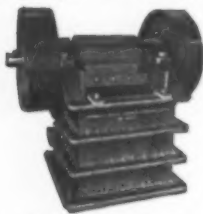
GRUENDLER CRAFTSMANSHIP

Employed by U. S. A. in the WAR EFFORT

HEAVY DUTY JAW CRUSHERS

(Stationary or Portable)

for—Heavy Ores,
Chemicals, Gravel
and ROCK Products



Roller Bearing JAW CRUSHER

Constructed of high carbon
cast steel and Manganese
for heavy crushing.



Developed by Engineers who
have made a Life Study of
Material Reduction problems,
keeping in step with new
features designed to meet
the demands for greater effi-
ciency and speed.

Write for Bulletin on Our
Large Capacity Hammer
Mills

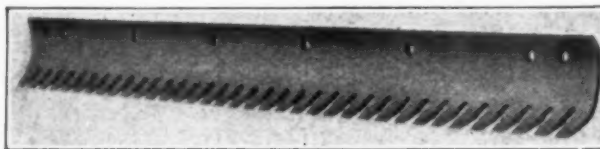
GRUENDLER

GRUENDLER CRUSHER & PULVERIZER CO.
PLANT and MAIN OFFICE — 2915-17 N. MARKET — ST. LOUIS, MO.

SHUNK

Specialist for 50 years in Manufacture
of Grader Blades

The SHUNK Saw-Tooth Blade



A Double Purpose Tool

Use it in the winter for breaking up ice
and packed snow on highways. Use it
all the year 'round for scarifying,
smoothing and leveling highways.

It can be attached to any Grader, Main-
tainer or Snow Plow.

Write today for circular

SHUNK MFG. CO.
Bucyrus, Ohio

Eighmy Equipment Co. Moves

The Eighmy Equipment Co., formerly located at 208 Blackhawk Bldg., Rockford, Ill., distributors of construction, industrial and material handling equipment, has removed its sales office from Rockford to 225 Sixth St., Rochelle, Ill. The company, owned by B. O. Eighmy, formerly sales manager of Link-Belt Speeder Corp., Chicago, covers northern Illinois and southwest Wisconsin. It represents exclusively the following firms: Link-Belt Speeder Corp., Universal Engineering Corp., Chain Belt Co., Davey Compressor Co., Cleveland Rock Drill Co., Wellman Engineering Co., DeSoto Foundry Co., J. E. Ingram Co. and others.

Art Quade Is Dead

Arthur H. Quade, eastern representative of Wisconsin Motor Corporation for the past seven years, with headquarters in New York City, died Feb. 20 after a brief illness. "Art" Quade, as he was known to his host of friends in the construction and marine fields, knew his engines inside and out, and would always go out of his way to be of service in any way possible. Although primarily occupied during the past two years on Government work, Art could usually take "time out" for helpful consideration

of wartime equipment and servicing problems of his customers.

The McCarty Co. 25th Anniversary

The McCarty Co., estimated to be the oldest and largest advertising agency west of Chicago, celebrated in February its Silver Anniversary. Founded in 1919 by T. T. McCarty, the agency after 25 years is still serving many of its original clients. Headed by McCarty as president, the company has headquarters in Los Angeles and operating branches in San Francisco and Pittsburgh. At its inception the entire personnel consisted of McCarty and one stenographer. In its present location in the Bendix Building, the agency now occupies space in excess of 10,000 sq. ft., and handles more than fifty of the Pacific Coast's largest industrial advertisers. In addition, it is serving out of its eastern offices many well known middle-west and southwestern organizations.

Hermann Promoted to Captain

Lt. Grover M. Hermann, Jr., on leave of absence from the American-Marietta Co., and a director of the company, has just been promoted to captain in the 8th Armored Division

at North Camp Polk, La. Captain Hermann entered the Army in October, 1942, as a second lieutenant at Fort Benning. Since then he has been stationed at Fort Knox and Fort Campbell.

New P & H Manager

Harnischfeger Corporation, Milwaukee, Wis., has announced the recent appointment of Frank J. Hirner as manager of the St. Louis district with offices at 4030 Chouteau ave., in that city. Mr. Hirner will be in full charge of sales and service in the area for the P & H lines. He is a mechanical engineer. Having



Frank J. Hirner

joined Harnischfeger immediately after college, Hirner's long experience includes service in various capacities in engineering and sales at the company's plants and field offices. One-time assistant manager of the welding division, he was most recently in the Chicago P & H branch as specialist on welding air-hardening steels for armored fighting equipment of all types.



WELLMAN

**WILLIAMS
TYPE**

BUCKETS

Williams Buckets have been famous for their many fine mechanical details for nearly 40 years. Since 1931, Williams Buckets have been built by Wellman.

WELDED CONSTRUCTION, featured in Wellman custom-built buckets, which made them so predominant in heavy duty steel mill service, is now applied to all

Wellman-Williams Buckets FOR LONGER SERVICE WITH LESS MAINTENANCE COST

Built in Multiple Rope, Power Arm, and Power Wheel Types in $\frac{3}{8}$ yd. to 16 $\frac{1}{2}$ yd. capacities.

Send for Free Bulletin Tell us about your particular requirement and we will send full description of construction and features in special bulletins which clearly prove why YOUR NEXT BUCKET SHOULD BE A WELLMAN.

THE WELLMAN ENGINEERING COMPANY
7003 Central Avenue • Cleveland 4, Ohio
Sales and Service Agencies in principal cities.

LaPlant-Choate Opens New York Office

LaPlant-Choate Manufacturing Co., Cedar Rapids, Iowa, builders of earthmoving and land clearing equipment has opened a sales office in the International Building, Rockefeller Center, New York City. The new office will be in charge of Jay Feters, formerly London Manager of Caterpillar Tractor Co., and more recently on the staff of the Chief of U. S. Army Engineers. Mr. Feters also represented Caterpillar in India, Burma, Afghanistan and Ceylon for six years.



Jay Feters

Heads Hot Rolled Sales

C. A. Young has been appointed Manager Sales, Hot Rolled Products Division, Sheffield Steel Corporation, Kansas City, Mo. Mr. Young has been with Sheffield ten years. Since 1937, he was manager of their district office, Chicago. He is a graduate

civil engineer from Purdue University. His entire business experience has been in the field of design, promotion and sale of material for reinforced concrete and structural steel construction. Mr. Young is widely known among state highway departments and the construction industry. From 1928 to 1937 he devoted his entire time to the promotion and sale of materials to these markets.

Koehring Appoints

Koehring Company, Milwaukee, have announced the following executive appointments for the company and its subsidiaries, Kwik-Mix Concrete Mixer Company, Parsons Company and the C. S. Johnson Company. These are:

J. R. Steelman, vice-president Koehring Company in charge of sales of all companies; George J. Dimond in charge of Koehring sales; A. E. Kelbe, Kwik-Mix sales; H. J. Holdsworth, Parsons sales; and J. F. Robbins, Johnson sales.

Wells New President Wheeler Lumber Bridge & Supply Co.

Warren M. Wells, heretofore vice-president and secretary, has been

elected president of the Wheeler Lumber Bridge & Supply Co., with headquarters at Des Moines. He succeeds the late Percy E. Hoak, who died in November at Miami, Fla., after a long illness. Other officers elected were Ensign James M. Hoak, son of the late president and now on active duty with the navy in the Pacific, vice-president; D. D. Staples, of Des Moines, secretary, and Mrs. P. E. Hoak, Des Moines, treasurer.

New Assistant Sales Manager for Novo

J. Dallas Chapman, since 1935 district manager of the central zone for Novo Engine Co., Lansing, Mich., has been appointed assistant sales manager. He has been with Novo for 20 years.

Mack Creates Contract Termination Department

George J. Hubert has been appointed manager of the newly created Contract Termination Department of Mack Trucks, Inc. The Mack company is devoting almost 100 per cent of its production to war materials and has had no major contract terminations to date, but is organiz-

WISCONSIN Air-Cooled ENGINES

Check for

SIZE and POWER ON YOUR EQUIPMENT

If you are interested in engines . . . either "on the board" for post-war equipment, or "on the job" for immediate applications . . . you can't go far wrong if you include Wisconsin air-cooled engines in your specifications.

The Model VE-4, dimensionally illustrated above, is a typical example of the extremely compact power packages that carry the Wisconsin name plate. This 4-cylinder engine delivers 22 hp. at 2600 rpm. Other Wisconsin sizes run from 1 hp. to 31 hp. Check for Size and Power on your equipment.

Most H.P. per pound

WISCONSIN MOTOR Corporation

MILWAUKEE 14, WISCONSIN, U. S. A.

World's Largest Builders of Heavy-Duty Air-Cooled Engines

A HIGH SPEED CRANE

Mounted on Pneumatic Tires
Operated by Air Controls

Owners and operators like the MICHIGAN for its handling ease and its quick convertibility to Clam. Dragline, Trench Hoe, and Shovel.

Two Sizes: 1/2 yard and 3/8 yard

Write For Bulletin C-4

MICHIGAN POWER SHOVEL CO.

BENTON HARBOR, MICHIGAN



EXPERIENCE
Builds 'em
PERFORMANCE
Sells 'em

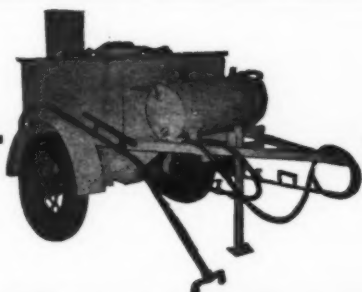


on ROGERS TRAILERS

TODAY even airplanes "bum a ride" on ROGERS TRAILERS. Deck houses for Victory ships . . . huge coastal defense guns . . . giant tanks, all are speeded towards completion and rushed to the fighting fronts on ROGERS TRAILERS.

In War and in Peace ROGERS TRAILERS have proven their ability to "deliver the goods". New models which will be available when war contracts are completed will be even better-engineered . . . more efficient than the thousands which have been used successfully by industry for many years.

ROGERS BROS. CORPORATION
ALBION,
PENNA.



ASPHALT and TAR KETTLES

FIRE PROOF—OIL BURNING
Hand and Motor driven spray.
Many sizes. Write for catalog.

Elkhart White Mfg. Co. Indiana

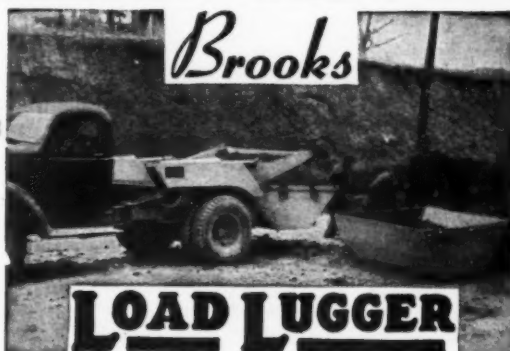
SILVER KING HIGHWAY MOWER



Watch out for those minor damages that might put your highway mower out of action for the duration. A little extra care prevents extra wear and repair!

If you own a Silver King, you'll see, more than ever, what it means to have a mowing unit ENGINEERED for the job. If you want replacement parts now to insure tip-top "good-as-new" performance tomorrow, write. We will be glad to serve you.

MANUFACTURED BY
THE FATE-ROOT-HEATH CO.
PLYMOUTH, OHIO



LOAD LUGGER

saves men, time and trucks

Today's emergency demands that you conserve equipment and utilize manpower to best advantage.

Ask about the new TruCrane Boom attachment for increasing the utility of the Load Lugger

Therefore mount a Load Lugger on every available truck chassis, and operate with several dump buckets . . . so that one truck can do the work of many.

This is the speedy, low-cost way to load and haul materials for roads and construction work.

Tilt-type . . .
Skip-type . . .
and special
buckets . . .
also Refuse
Container
available

Write for Catalog No. 44.

Distributors in all Principal Cities
503 Davenport Road

Brooks EQUIPMENT & MFG. CO.
KNOXVILLE, TENNESSEE

STAUNCH

DEPENDABILITY



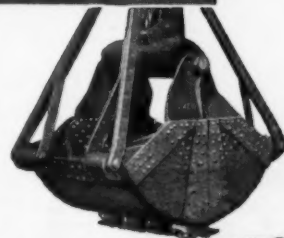
Through demonstrated dependability servicemen have come to place implicit confidence in the ever faithful and efficient American Red Cross.

Through long demonstrated performance, too, bucket users have come to depend with confidence upon Owen Buckets as the most rugged and dependable units available to meet their various important requirements.

THE OWEN BUCKET CO.

BREAKWATER AVE., CLEVELAND, O.

BRANCHES: New York, Philadelphia, Chicago, Berkeley, Cal.



OWEN BUCKETS

ROADS AND STREETS, March, 1944

ing and preparing for the complexities attendant on the termination phase of war production contracts.

New Canadian Distributor for Caterpillar

Announcement has just been made by Caterpillar Tractor Co. of Peoria, Ill., of the appointment of Geo. W. Crothers, Ltd., Leaside (Toronto), Ont., Canada, as distributors for eastern Ontario for the complete "Caterpillar" and Allied Equipment line of products. These products include Diesel track-type tractors, Diesel high speed, rubber-tired earthmoving equipment, Diesel motor graders, Diesel engines and electric sets, and the Allied Equipment Manufacturers' products include those of LaPlant-Choate Mfg. Co., Inc., Athey Truss Wheel Co., Willamette Hyster Co., Trackson Co., and Killefer Mfg. Co.

Brayback Joins Drott

Ray Brayback, highway commissioner of Wood county, Wis., for more than four years, has resigned, effective April 1, to accept a position in the sales organization of the Drott

Tractor Co., Inc., Milwaukee. He will represent the Drott firm in the territory in that portion of central and northern Wisconsin extending west and north of Fond du Lac. He succeeds Clarence Williams, who is leaving for Louisville, Ky., where he will head a company of his own.

R. C. Larkin Returns From Army

Major Rex C. Larkin has returned to the presidency of the R. C. Larkin Co., distributors, Chicago. He had served in the tractor and crane section of the Chief of Engineers' Office, U. S. War Department for about two years until his recent retirement to an inactive Army status. The Larkin company is distributor for tractors, scrapers, bulldozers, shovels, cranes, rollers, pumps, compressors and other construction machinery; and has offices, warehouse, sales department and service shops at 3001 S. Wabash Ave., Chicago.

New President of Tyson


John K. Colgate has been elected president of Tyson Bearing Corporation, Massillon, O., succeeding Ralph Maxson, who resigned recently. Mr.

Colgate has been vice president and treasurer of Tyson Bearing Corporation for three years. In addition he is a director of Colgate-Palmolive-Peet Company; director, treasurer and secretary of Van Strum & Towne, Inc., well known New York investment counsel firm, and trustee of Colgate University.

New Trade Literature

POWER TAKE-OFF—A new, illustrated folder showing how the Davey power take-off enables the truck engine to power such auxiliary equipment as pumps, generators, air compressors, concrete mixers, welders, etc., has been issued by the Power Take-Off Division, Davey Compressor Co., Kent, O. The development of the power take-off, the construction of the unit, its advantages in modern industrial use are concisely outlined. Specifications of the three standard models of the Davey Power Take-Off are included. Bulletin E-166 available upon request.

POWER... to tip on its toes
SPEED... to keep tractors humming
STRENGTH... to finish whatever it starts
FLEXIBILITY... to apply itself on your work



WHEN THE WAR IS WON

Byers will offer you new, improved, faster mobile cranes and shovels for peacetime jobs.

BYERS **CRANES AND SHOVELS**
 RAVENNA, OHIO
 DISTRIBUTORS THROUGHOUT THE WORLD

ROADS AND STREETS, March, 1944



CAN'T GET 'EM UP in the morning!
 It's those luxuriously comfortable beds at all
DEWITT OPERATED HOTELS

In Cleveland HOTEL HOLLENDEN	In Columbus NEIL HOUSE
In Lancaster, O. THE LANCASTER	In Corning, N. Y. THE BARON STEUBEN

Check IN
 THOS. DEWITT PRESIDENT
DEWITT OPERATED HOTELS



**THEY ARE
BACKING
THE ATTACK**



The ultimate success of any attack is dependent upon adequate supplies and equipment for their transportation. Today, it is in this service that you will find the ruggedness and dependability of Perfection Truck Bodies making the same outstanding performance records they made for you in peacetimes. Future ads will keep you informed of our ability to again supply your needs for Truck Bodies and Hoists.

THE PERFECTION STEEL BODY CO.

Galion, Ohio

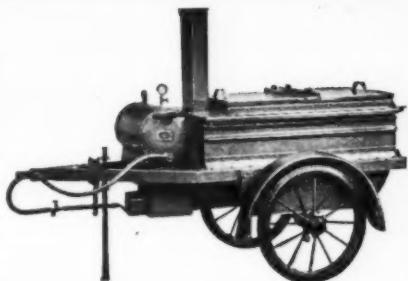


PERFECTION

TRUCK BODIES AND HOISTS

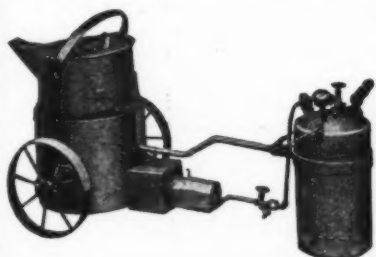
CONNER'S HEATING KETTLE

*For speedy
heating of
tar and
asphalt—*



Use this CONNER oil-burning Patrol Patching Heater on the small job and this CON-

NERY oil-burning kettle for large-quantity production.



Write for catalog showing our full line of tar and asphalt heating kettles, spraying attachments, pouring pots, etc.

CONNER CONSTRUCTION CO.

3900 North Second St.

Philadelphia, Pa.

*One
man
SPREADER*



**For SEAL COATING and
ICE CONTROL** with fewer men
at less cost

The FLINK Spreader

The Flink self-feeding spreader is strictly a one-man outfit. Operated by driver of cab, who can throw spreader into action as he rapidly approaches, crosses and leaves intersection. Then it can be thrown out of action. Flink spreads forward or backward, full width of street, or less than half width. Handles sand, cinders, etc., up to 1" in size, wet or dry, spreading evenly up to 35' width. Does not limit use of truck for other purposes as Flink spreader fits on end as a tall gate. Positive agitation, no bridging. Flink spreader will pay for itself many times over the first year in labor saved, in extra yardage covered and reduction of complaints.

The FLINK CO., STREATOR, ILLINOIS

For particulars write our nearest representatives:

WICO SALES
2924 N. Western, Chicago 18,
Illinois

G. W. CLEMENTS
3050 Fremont St.,
Columbus 4, Ohio

C. R. HANSON
2303 Grand Ave.
Kansas City, Mo.

TULSA MACHINERY CO.
Tulsa, Okla.

NORTHLAND DE LUXE EQUIPMENT CO.
Janesville, Wis.

H. C. JORDAN
Irvington, Kentucky

WISCONSIN OIL & EQUIPMENT CO.
34 Park Ave., Oshkosh, Wis.

RELIANCE

**CRUSHING, SCREENING
and WASHING UNITS**

• Up to 2000 Tons a Day •

Crushers
Elevators
Sweepers
Screens
Wash Boxes

Bin
Pulverizers
Feeders
Spreaders
Kettles
Conveyors

Drag-Lines
"GAYCO"
Centrifugal
Air Separators

UNIVERSAL ROAD MACHINERY CO.
Kingsston, N. Y.

Canadian Representatives: F. H. Hopkins & Co., Ltd.
340 Canada Cement Co., Montreal, Que., Can.

**PORTABLE
ASPHALT PLANTS**
High Production—Low Cost



THE McCARTER IRON WORKS, INC.
NORRISTOWN, PENNA.

NEED A BIG Trailer?

*La Crosse Makes Them
Up To 100 Ton Capacity—*
★ WRITE OR WIRE ★

LA CROSSE TRAILER & EQUIPT. CO.
LA CROSSE, WISCONSIN U. S. A.

ROADS AND STREETS, March, 1944

Clearing House

For Sale

Trenchers
Barber-Greene 44-C; 18-24" x 8'3"; like new.
Cleveland Pioneer; 26" x 10'; adjustable boom.
Parsons 21; excellent condition.
P & H 10-30; 35" x 13'; adjustable boom.
Buckeye No. 4; (Farm) 24-30" x 8'6".
Cleveland Baby; 22" x 5'6".

Tractors
35 Caterpillar; Trackson Side Boom.
40 Caterpillar; Diesel; LeTourneau Angle-dozers.

50 Caterpillar; Euclid Hydraulic Bulldozer.
RD-7 Caterpillar; Double Drum Hoist; Le Tourneau Bulldozer; 10 yd. Carryall Scraper.

D-8 Caterpillar; 14 yd. LeTourneau Scra-per; LeTourneau Angledozer.
T-20 International; Bucyrus-Erie Angle-dozers.

Auto Patrols
Adams 51; dual tandem; 14' blade.
Caterpillar 10; single tandem; 12' blade.
Caterpillar Diesel 11; dual wheel.
Austin-Western 77; dual tandem; 12' blade.
7-S Jaeger Mixer; 4 cyl.; excellent rubber; hoist.

10B Bucyrus-Erie Shovel.
600A P & H 1 1/4 Shovel; D-11,000 Caterpil-lar Diesel Engine.

Insley 1/2 yd. Dragline.
40 Lorain Combination Dragline and Shovel.
29 Browning 1/2 Crane.
75A Lorain Shovel.

75B Crane.
104 Northwest Combination Shovel and Crane.
10-30 Bucyrus-Erie Crane Boom and Back-hoe Attachments.

Two 600 Smith Welders.
THE CHAS. M. INGERSOLL CO.
Rocky River 16, Ohio.

For Sale—2-7 1/2 ton sterling dump trucks, TD9 tractor, 50 ton Rogers trailer, and Bucyrus Type B2 steam shovel.

For Rent—1-1 1/2 yard gasoline shovel and backhoe with 36" and 42" bucket.
DOOLEY BROS., INC.
39 George Street Roxbury, Mass.

HELP WANTED

Wanted: Asphalt Plant Foreman. Must be experienced in operating hot-mix plant. Give references and salary expected. SEA-SON'S WORK, and might be permanent. Box 68, Roads and Streets, 330 So. Wells Street, Chicago 6, Ill.

Wanted: Street Foreman. For laying asphalt mixtures, must be experienced. Give references and salary expected. Permanent position to person who can fill position. Box 70, Roads and Streets, 330 So. Wells Street, Chicago 6, Ill.

NOTHING LIKE

All-Wheel-Drive

FOR ROAD-BUILDING AND
SNOW REMOVAL



• Standard Ford economy and efficiency, with the added advantages of traction on all wheels gets the hard, tough jobs done faster and at lower cost. Write for literature.

MARMON-HERRINGTON CO., Inc.
INDIANAPOLIS 7, INDIANA, U. S. A.

FOR SALE

Tanks
5—10,000 gal. & 12,000 gal. R.R. Car Tanks with coils.
4—15,000 & 18,000 gal. cap. horiz.

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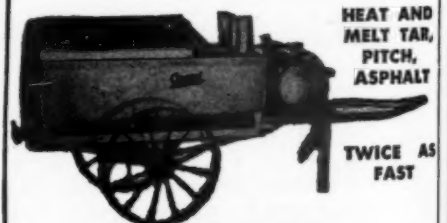
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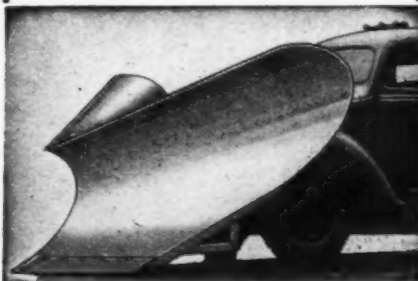
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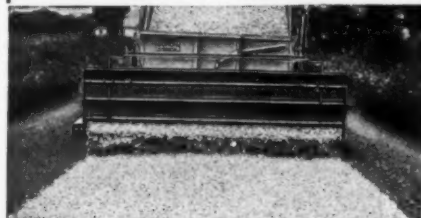
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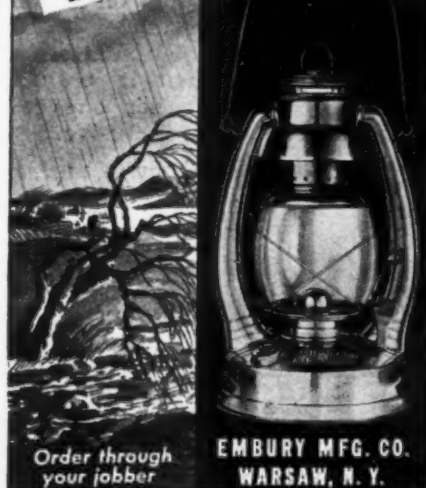
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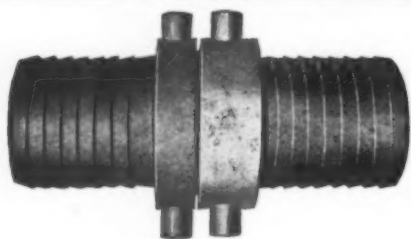
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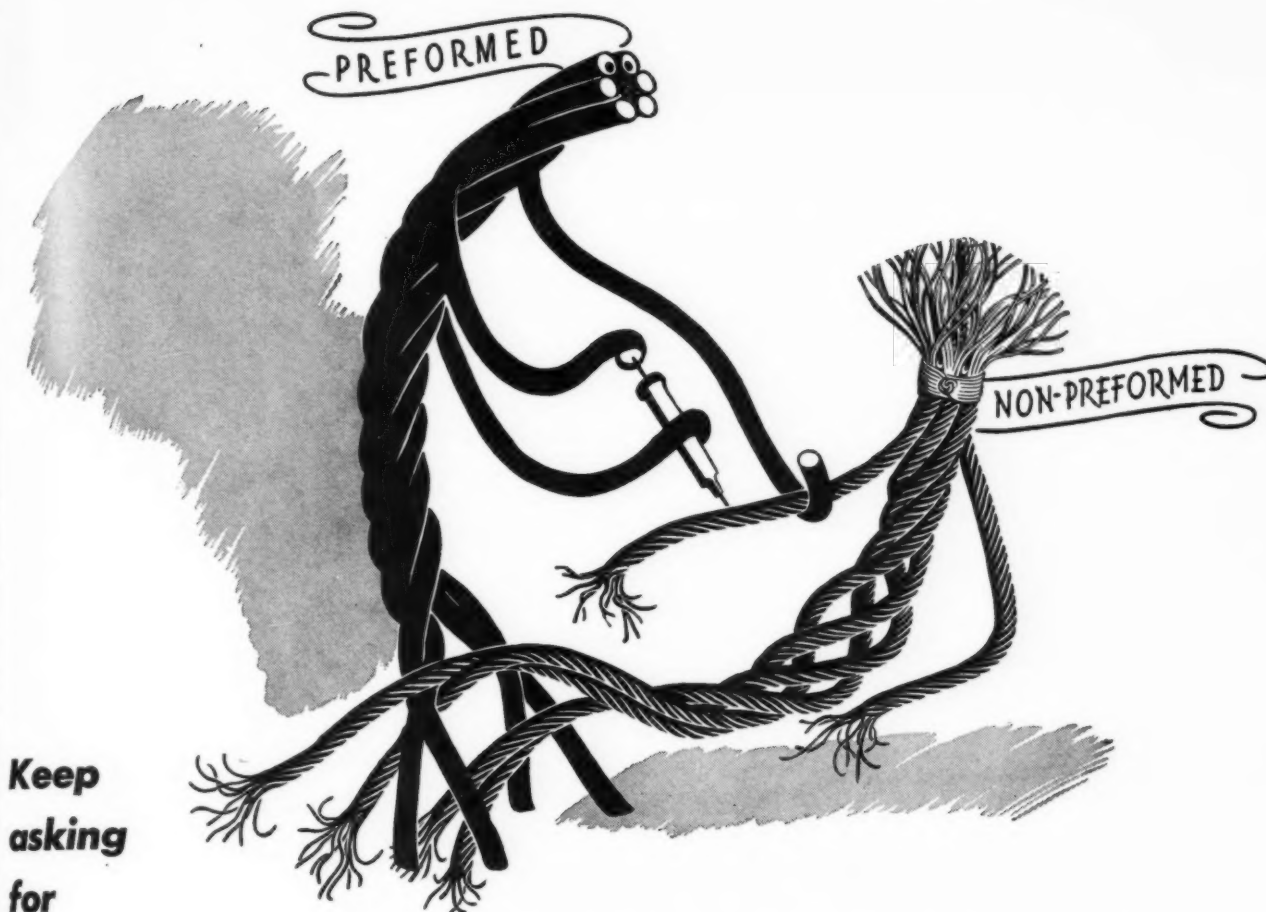
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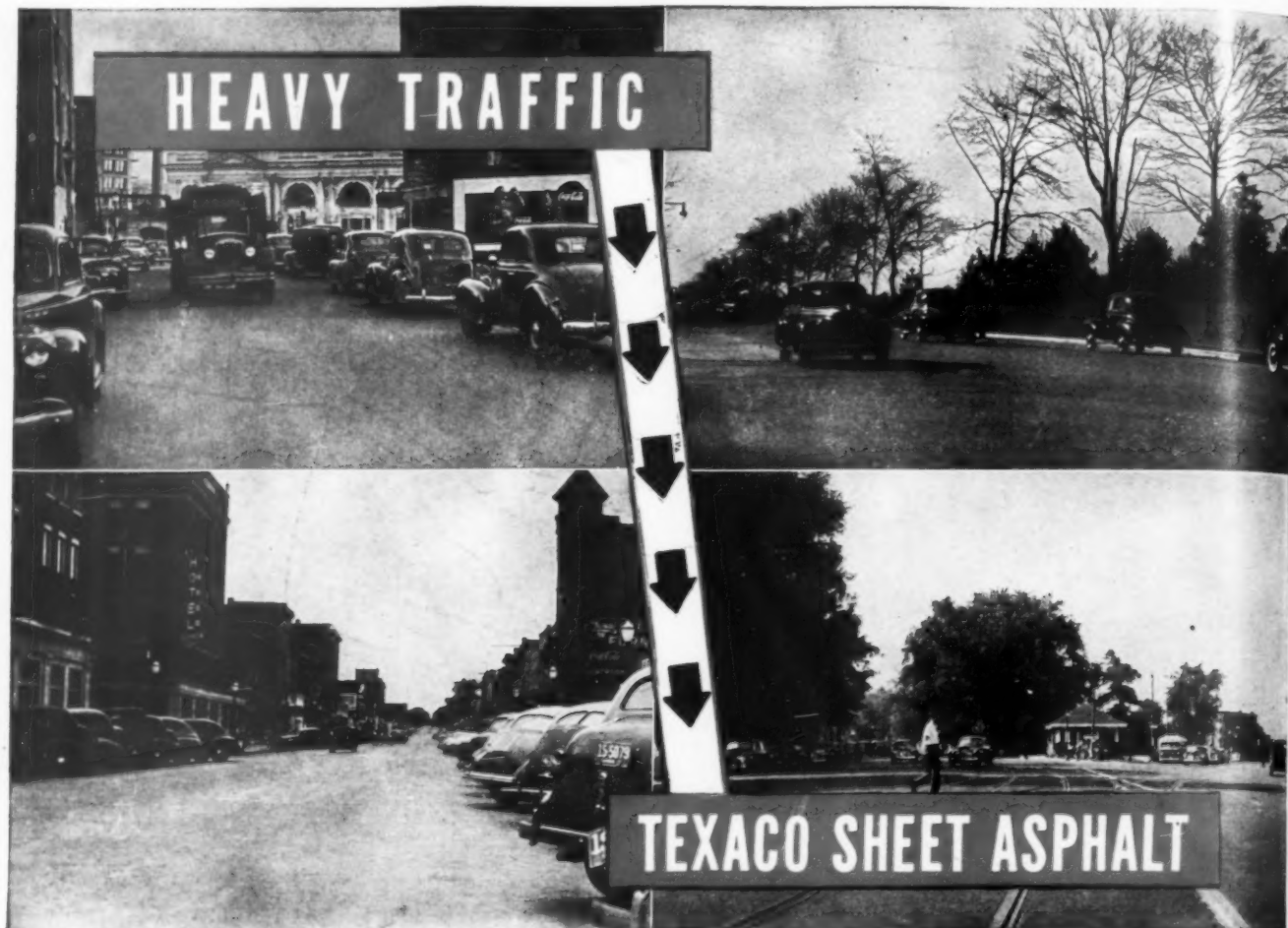
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